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Popular Beliefs and Superstitions About the Eyes

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THE atom of truth in most superstitions probably accounts for the persistence of the human race in believing in them. Dr. Bahn discloses here many of those regarding the eye

MANY great medical discoveries and some of our most modern medical methods have been known in folklore for hundreds and even thousands of years. Apparently foolish customs may contain a grain of important truth which is based on keen observations of cause and effect and is responsible for their persistence.

Red Flannel and Smallpox

The modern physician does not prescribe red flannel underwear for smallpox patients, yet this was a popular remedy during several hundreds of years. Now, infra-red light applications are used to accomplish the same result more pleasantly and effectively. Both, however, are applications of the same principle, heat-light. Many of the world's greatest medical contributions have been essentially more efficient applications of fundamental truths contained in popular beliefs, which some observer was keen enough to see, intelligent enough to investigate, and persistent enough to reapply more effectively. For example, Jenner's discovery of vaccination for smallpox was only a more practical application of the then-popular belief that those who milked cows had the disease less often. Some great medical advances of the future will probably also grow out of important fundamentals hidden away for ages in familiar customs. Popular medical beliefs have existed as long as mankind and probably will continue—sometimes accomplishing good, sometimes harm, and usually neither.

The Blindness of Tobit

Peculiar coincidences are encountered in health superstitions and beliefs. The blindness of Tobit and its cure, as told in the *Apocrypha*, is an interesting example. Tobit, the father of Tobias, while reclining in the courtyard of his home, was struck in the eye by the excrement of a bird flying overhead. Blindness resulted. The recovery of his sight, as quoted from the book of Tobias, is even more interesting:

> Chapter 6, Verse 2: "When Tobias went down to wash himself in the Tigris, a fish leaped out of the river, and would have devoured him. The Angel of the Lord told him to take out the gall, and to put it up in safety." Verse 6: "Tobias asked the Angel what was the use of the gall." Verse 8: " 'As for the gall,' said the Angel, 'it is to anoint a man who has whiten in his eyes, and he shall be healed.' " Chapter 7, Verse 11: "Tobias took hold of his father and stroke of the gall in his eyes, saying, 'Be of good hope, Father.' " Verse 12: "And when his eyes began to smart, he rubbed them." Verse 13: "And the whiten fell away from his eyes, and when he saw his son, he fell on his neck."

Tobit's affliction would probably be recognized by the modern eye physician as an ulcer of the cornea caused by the pneumococcus, a germ often found after an injury of the eye by contact with something unclean. The coincidence lies in the fact that bile salts, which are contained in gall, are among the very few drugs which dissolve pneumococci. The use of this same drug for the same infection of the eye is the subject of very recent medical experiments. In short, this new discovery apparently dates back to the cure of Tobit.

Religion and Health

Quite a few popular beliefs, superstitions, and religious customs originated as hygienic measures enforced by religious leaders. Let us look upon all religions as schools of health and happiness—physical, mental and moral. On physical health largely depends mental and moral health. The devotion of Sunday, or one day in seven, to rest and relaxation is the best possible division of the

week, developed through the experience of billions of people over thousands of years. The Jewish proscription of pork was originally necessitated by trichinae and other parasites which infested hogs and affected the health of persons who ate pork. Though the cause has long ceased to exist, the custom still prevails. Likewise, the Jewish rite of circumcision materially reduced the frequency and severity of some affections to which tropical peoples are especially liable. The dietary and other restrictions of the Lenten season better fit the average person for the approaching hot summer. The care-free happiness of Christmas, which encourages good will among mankind, actually promotes health.

Health superstitions were based on the concept that good health, in one form or another, represented the blessing or good will of a deity. Disease or ill health, on the contrary, represented the anger of a god whose dictates had been violated; or, if evil was personified, the machinations of a devil or evil spirit. For example, the ancient gods of Yucatan included a "Lord of the Solar Eye," who caused any neglect on the part of his worshipers to be punished by disease or injury to their eyes. Christians of the Middle Ages also sought to protect their eye health, or to restore it, by calling upon Saint Clare, patron saint of the eyes.

Our modern conception of the same idea is that violations of fundamental hygienic laws will cause sickness in one form or another. In one case sickness follows the disobedience of religious dictates; in the other, sickness results from voluntary disobedience of hygienic laws formulated through experience.

Soap and Superstitions

The keen observation of cause and effect, and the sound psychology on which many popular medical beliefs and superstitions were based, actually accomplished very little because of one thing, the lack of cleanliness. Three of the major causes of blindness—gonorrhea, syphilis and trachoma—which have caused millions of human beings to lose their eyesight, are transmitted by uncleanliness. They are less frequent and less severe in nations where soap is most used for bathing purposes.

Among the ancient nations the cleanliness of the Romans was proverbial, a fact which probably aided the rise of Rome to power

by preserving the health and strength of her people. The remainder of the ancient world was not particularly interested in physical cleanliness. During the Middle Ages personal cleanliness was apparently a lost art, as illustrated by the astounding fact that Queen Elizabeth took a bath about once a month, whether she needed it or not.

Only in the past 75 years has there been even a slight interest in the details of disease prevention by physical cleanliness of both persons and surroundings. Mental and moral cleanliness has always received much attention in popular beliefs and superstitions, but physical cleanliness was usually sadly neglected. In many medieval ocular remedies chastity and piety were considered essential. Both tended to increase bodily resistance through moral hygiene and also to reduce syphilitic and gonorrheal eye diseases.

Soap and superstitions don't go together. The nations who pay least attention to physical cleanliness have the most superstitions. The same emotionalism which has accomplished so much in the world of art easily lends itself to belief in the fantastic, and is often not accompanied by a correspondingly strong urge for the use of soap.

Fear and Disease

Popular superstitions and beliefs usually contain a mental and a physical factor. The mental part increases the individual's confidence in recovery and his urge to get well. A panicky fear is now no more conducive to health, happiness, or the recovery from disease than it was five thousand years ago. Germs have probably shortened fewer lives than panicky fear. Observant leaders of all times have used the best means at their command to overcome this state of fear in their followers and to foster it in their enemies.

Action and Reaction

Action of some sort is usually necessary for accomplishment. Mere thought is not sufficient. In some instances popular beliefs were originally based on observation, which, correctly or incorrectly, correlated cause and effect. In others, the performance of some unusual act which had no relation to cause and effect

simply increased the individual's confidence in recovery and thus augmented the urge to get well. Participation in group ceremonies has always played an important rôle in religion and emotion. The operation of the Chinese prayer wheel represents the last word for those in whom this mental attitude can thus be aroused.

Myths About Eyes

Through all mythology the eye has been held in reverence as a symbol of the all-seeing god. The Egyptian symbol of their great sun-god, Ra, was an eye, indicating the power of vision and light. The Greeks worshipped the sun as the eye of Zeus, while the Norse peoples reverenced it as the eye of Wotan. Another of the protective Greek gods was Argus, whose eyes were the stars that never all closed at once. Classical myths also tell of the less benevolent giants, the Cyclops, whose single eyes carried strength and terror. The symbolism of the all-seeing eye, in one form or another, exists today, especially in secret organizations.

Belief that the sun is the eye of the universe persisted down to the seventeenth century. When sun spots were discovered, there arose great indignation at the thought that the eye of the universe should have so common an ailment.

A New Zealand legend tells that brave chieftains possess divinity which is contained in their eyes. A young warrior who slays a chieftain transfers that divinity to himself by gouging out and swallowing the eyes of his victim. The eye is also reverenced among some African tribes as the germ or seed from which the individual may be grown. Around this belief legends have been created telling of the restoration of a dead child by keeping its eye in water until the body was regrown.

Beware of the Evil Eye

Reverence for the unknown can easily be transformed into an unreasoning fear of anything that suggests it. The varied and almost universal superstitions which center about the evil eye are based on the simple fact that some persons express emotions strongly in their eyes and face muscles. Those who have much energy and self-control can, with a little practice, look others directly in the eye for an unusually long time, tending to frighten,

mystify, or dominate other personalities less gifted. Frequent mention is made in ancient and modern history, especially among emotional peoples, of death and disease caused by the glance or look of people who exerted an evil influence on others. In Africa, over a hundred persons were supposed to have been killed within a few years by the spell of such a person. The real story will probably never be known.

It is possible that the so-called evil eye was also attributed to those with all sorts of ocular disfigurements. Among the brunette people of the Mediterranean region the evil eye is supposed to be blue, while the blond races of northern Europe think of it as black.

Let us analyze a number of popular superstitions and beliefs better to understand why such apparently foolish means were used to treat eye diseases. In some seemingly ridiculous remedies the same fundamentals are employed which modern medicine now uses more effectively.

Why Have Styes?

Styes are small abscesses near the roots of the lashes and pain is caused by pressure on the nerves. Relief of this pain is partially obtained by the use of heat, massage or discharge of the enclosed pus. Rubbing the stye with a gold wedding ring in compliance with a current superstition supplies the warmth and massage. The ring itself may have the advantage of being smooth, moderately clean and possibly sacred.

"Take a pebble from a running stream and, after rubbing the stye with it, throw the pebble back into the stream." Here, massage with a smooth, clean object is recommended, and even a faint suspicion of surgical cleanliness is suggested in throwing the pebble away after using it.

"Rub a black cat's tail over the eye nine times to cure a stye." Again massage is suggested, although the outstanding feature in the performance of this unusual cure is the surprise of the cat, if not the patient. In the scuffle, which might easily ensue through the misinterpretation of motives, anything might happen to the stye. The tameness of the cat would seem a very important factor in the outcome of this treatment.

"Wear a nutmeg hung round your neck to cure a stye." The

only merit in this remedy is the stimulation of confidence in recovery. In a similar superstition of wearing asafoetida about the neck to prevent sore throat and diphtheria, there was, in addition to a possible mental benefit, a slight sensation of warmth and an odor which possibly out-stunk the sore throat.

"To rid yourself of a painful stye, go to a crossroads and turn around three times." Here, the performance of an unusual act in an unusual way illustrates how the urge to get well was augmented without apparent connection between cause and effect.

Pierce the Ears to Cure the Eyes

An old and interesting form of human adornment is the wearing of earrings, a custom prevalent especially among primitive people since time immemorial. Piercing the ears to supply support for this ornament involved the letting of blood, and gradually developed into a ceremony containing all the elements of awe and mystery connected with the drawing of blood. As a remedy for sore eyes, when the sufferer was an adult, its chief value was to increase confidence in recovery. In infants, the tears brought forth by the pain of the operation probably washed out any secretion which may have been present in the eyes.

Lemon Juice in Babies' Eyes

The use of lemon juice, freshly squeezed, to prevent or cure sore eyes in babyhood is still respected in rural sections of Spain and Spanish-speaking countries. While citric acid has no power to strengthen the eyes, as old wives and grannies believe, it has some caustic action. The remedy must surely have effectively followed the saying, "No pain, no cure." The same principle of weak caustic drops is the basis of Credé's method of preventing gonorrhea in the eyes of the newborn. In the latter, silver nitrate takes the place of lemon juice.

Boric Solutions

Boric solutions, as used in the eyes, probably have never killed a germ or cured an infection. If you doubt this, place a solution of boracic acid in the air a few weeks and watch it become cloudy from a fungus growth. The popular faith in the curative virtues

of boric solutions depends largely on the fact that plain water will burn in the eyes, but boric solutions will not. Because they are not irritating, they produce a relative sense of comfort, a fact which, during several generations, was taken to indicate healing and antiseptic qualities. Aside from washing out mucus, boric solutions have but little place in the cure of eye diseases except to augment the urge for recovery. The same applies to normal salt solution, and some other drugs which are used in many of the proprietary eye drops and washes on the market.

Bonfires and Flowers

In many remedies of the past the physical factor in health restorations was limited to participation in ceremonies of different sorts which, in reality, only stimulated the confidence in recovery and the urge to get well. A widespread European ceremony was the celebration of midsummer night with huge bonfires and flowers. It was believed that persons who looked at the fires on that night through the petals of flowers would be protected from pain or disease of the eye for the coming year. Staring steadily at the fire without blinking was supposed to strengthen the eyes and cure them of disease. In reality, the protection against glare afforded by the flower petals was slight, and staring at the fire was only foolish. Both are examples of the false reasoning which characterizes most superstitions.

Hocus-Pocus

As far back as the heyday of Babylon and Assyria, sore eyes were cured by magic. An incantation was repeated over a black and white cord in which "twice seven knots" were tied. The mystic number seven, the symbolism of the knots, the contrasting colors of the cord, and the awesome solemnity of the chant, all provided an impressive setting for the fundamentals of mental medicine—the confidence in recovery and the urge to get well.

During the Middle Ages, a similar "cure for sore eyes" consisted in wearing around the neck a clean sheet of paper containing a magic formula of meaningless Greek words. This charm was guaranteed, however, only if both charmer and charmed were "in

a state of chastity," the verification of which was difficult, if not impossible.

Cleanliness and Godliness

The miraculous healing powers of sacred springs have been believed in and reverenced for centuries. The Bible tells us that, in the pool of Bethesda near Jerusalem, an angel came down to trouble the waters, and the first blind person who bathed in the spring thereafter was cured of his affliction. Although cleanliness is an important factor in preventing disease, baths, especially in dirty water, are hardly curative of blindness except possibly in the temporary forms associated with mental disturbances such as hysteria.

Similar miracles of healing eye diseases have been reported in medicinal wells like the famous Thruston wells in Northumberland. The miserable taste and fowl smell of these waters possibly hastened the urge to get well.

A Modern Miracle

The current superstition that to look at a hundred-dollar bill will cure sore eyes is another example of mind over matter. The pleasant surprise associated with even looking at a hundred-dollar bill, if there are such still in circulation, gladdens the heart and probably lends luster to the eyes.

An Eye for an Eye

Remedies for sight deficiencies were often developed through an interesting process of reasoning. The owl is able to see in the dark. Man could not, but wanted to. In India, therefore, it became the custom to eat the eyeballs of an owl to see better in the dark. Similarly, in Brazil, dropping the fluid from the eyes of a particularly keen-sighted falcon into the eyes of a human being was thought to increase his keenness of sight.

Another similar superstition concerns the ocular healing powers of bezoar stones. These were supposedly found in streams and were believed to have fallen from the eyes of stags.

Gland Therapy of the Past

It is possible that the use of body substances for treatment of eye diseases originated from the association, first, of eye with eye and, later, of one part of the body with another. The use of secretions and excretions of one sort or another to cure disease in other parts of the body was frequent, and was probably the forerunner of modern endocrine therapy. Through the whole gamut of popular remedies and superstitions we find repeated use of all sorts of organs and fluids, both animal and human, to cure diseases of almost any part of the body.

Brains

In the Papyrus Ebers, written over 4,000 years ago, human brains were prescribed as follows for sore eyes: "Mix one half of a healthy human brain with human bones and with it anoint the eyes each evening. Dry and finely powder the other half of the brain and with it anoint the eyes in the morning." Aside from its impressiveness and the inference of intelligence, this prescription is most interesting because the brain used had to come from a healthy man who died violently, thus avoiding the possibility of disease transmission. At the present time, pituitary gland extracts of the brain are used in the treatment of eye diseases.

Milk and Saliva

Warm breast-milk was used by the ancient Egyptians, Hindus, and Arabs to cure eye diseases. No harm probably resulted to the eyes from the use of this secretion except for the delay in obtaining more effective treatment, especially in gonorrheal infections. It is warm, non-irritating, oily, and above all, reasonably clean.

Another secretion to which curative properties have been popularly and incorrectly given is saliva. In ancient Rome the daily application of a woman's spittle was used to cure sore eyes. Today, spitting in one's eye is justly a cause for war. The celebrated Saracen physician, Rhazi, recommended it to be dropped into the eyes after an operation. Early in the Middle Ages, the great Avicenna also prescribed this remedy. Even earlier, in Maori mythology, Tawhaki restored the sight of a blind woman "by

anointing her eyes with spittle mixed with clay and slapping them with his hand."

Although fresh saliva is warm, viscid and non-irritating, it unfortunately contains germs which, especially in a bruised eye, may cause permanent blindness within a week.

Urine and Gall

Probably no popular treatment in the world's history has done more harm than the use of urine in the eyes. Hundreds of thousands have probably owed their blindness to this home remedy which infected them with gonorrhea and other diseases. Tragically, most of them were infants. This treatment, unfortunately, fails to take into consideration that some of the most serious eye diseases are transmitted by contact with infective matter, especially urine. Without this knowledge, one can easily understand why fresh urine was used in the eye. It is warm, and does not burn like water. Only education about personal hygiene can eliminate such treatment methods as this which, unfortunately, still exist.

The urine of a faithful wife was recommended by the early Egyptian physicians as a remedy for sore eyes. Folk-tales tell of the enormous difficulty in obtaining usable material for this remedy!

Among the colorful characters of history, one of the most interesting was Pope John XXI who had previously been an oculist, a physician and a philosopher. He recommended, after the needling operation for cataracts, a collyrium made of human gall and infants' urine. If this was not successful, the patient was advised to look through dark-colored crystals. History tells us that this pope's life was suddenly terminated by the falling-in of the roof of his mansion at Viterbo and, in the light of modern science, his fate was not altogether unjustified.

Human, animal and vegetable gall are among the most persistent remedies for eye diseases mentioned in many countries, through many centuries, and in many books, including the Bible. Mental gall, popularly called audacity, is not mentioned, although it has always played an important rôle in mental medicine. The Greeks believed that bleared sight could be cleared by means of eagles' gall smeared on the eyes, while the Anglo-Saxons attributed the

same virtue to ox-gall. The Chinese still use ox-gall for this purpose. In ancient Rome, human gall was employed to cure cataract.

Gall contains tannic or gallic acid which produces an astringent or drying effect in the mouth, somewhat like green persimmons. Primitive people apparently inferred that it would similarly dry up eye secretions which are especially frequent among tropical peoples. Today, in the treatment of trachoma, astringent drugs, including tannic and gallic acids, are used, an apt illustration that some of the same remedies now employed were in use for the same diseases three or four thousand years ago.

Cause and Effect

Popular observations have led to beliefs which were sometimes correct and sometimes very incorrect. The superstition that an itching eye forewarns trouble often proves to be true because an approaching stye is frequently a signal of a lowered vitality which invites illness.

Less accurate is the belief that measles cause crossed eyes. Children frequently develop crossed eyes during the ordinary diseases of youth, or very shortly thereafter. Any slight illness will apparently cause one eye to cross if a child already has defective pulling power of the eye muscles, defective focusing, especially of one eye, or defective development of the visual part of the brain. All probably existed, separately or combined, since birth. Having done no very close visual work as yet, such children have often been able to keep their eyes straight. As soon as they begin to use their vision more closely, or vitality is lowered by any disease, such as measles, they can no longer bear the fatigue of seeing together with both eyes, and pointing them correctly at the same time. The better seeing eye is then usually pressed into service for more accurate vision, and the other eye points in the direction where ocular fatigue is least. Measles, therefore, is, at most, only an aggravating factor in crossed eyes.

That children outgrow crossed eyes is a fallacy. Crossed eyes practically always tend to become worse unless straightened by glasses, training or operation. The original reasons why one eye crossed continue to exist, so that the probability of both eyes seeing together and pointing correctly, unless properly treated, becomes

less with each succeeding month. The longer the eyes squint, the harder they are to straighten. In fact, some authorities say that, technically, squint is incurable after the age of six.

Eye Teeth and Eye Diseases

The upper second incisor tooth has been popularly called the eye tooth because it was thought to point most directly toward the eyeball. Contrary to popular belief, however, statistical information shows that it does not cause eye disease more than any other tooth, and, like all other teeth, will cause no eye trouble unless it is infected.

Weak Eyes and Chewing Gum

Another interesting popular belief based on an incorrect interpretation of cause and effect is that chewing gum weakens the eyes. Since time immemorial human beings have chewed gums of many kinds, for flavor, appetite, relaxation and beauty, if not for poise. Especially in the novice, prolonged chewing does tire the face muscles, the weakest of which are those of the eyelids. The arduous use of gum may therefore produce a slight sense of fatigue noticeable in the eyelids. When manufactured chewing gum first came into vogue parents fostered this popular belief to discourage its use among children.

Growing a Mustache

The old belief that growing a mustache cures weak eyes is still another case of coincidence misinterpreted as cause and effect. During adolescence, skin eruptions, including styes and other lid inflammations, are more or less frequent. The development of the beard or mustache marks the end of adolescence and the advent of maturity when some skin eruptions, including those involving the lashes, usually diminish.

Moonlight Blindness

Not many years ago night blindness was popularly believed to come from sleeping in the moonlight. People devoid of superstition thought it just happened. Now we know that it is due to poor ability of the eye to respond to light changes and has many

causes, ranging from food deficiencies to defective ancestors. Other causes probably remain to be discovered. Sleeping in the moonlight is not yet one of them, although the restlessness associated with sleeping in excessive light of any sort might aggravate night blindness previously existing in a hypersensitive person.

Glasses Do Not Weaken the Eyes

The popular prejudice against glasses, which is fortunately subsiding, is largely due to the inference of disability which they convey, the physical discomfort of wearing them, and the belief that glasses have often been uselessly prescribed. Unfortunately, this last accusation has been occasionally justified although its occurrence is rare.

Among the fundamentals involved in the large majority of apparently unnecessary and unsatisfactory glasses are: incompetent testing, poor frame fitting, failure to reduce the various factors which have caused the patient's eye symptoms, and, lastly, a lack of real understanding between eye physician and patient. The need and benefit of correcting lenses to the patient often depend, not only on accurate testing of the eyes, but also on a broad understanding of the individual's eye use. Some patients unfortunately seem to believe that all their ills will be cured by the purchase of a pair of glasses, which can be worn to advantage in a coat pocket, a lady's purse, or a desk drawer.

Correcting lenses place the focusing power, which should be inside, in front of the eyes. If this focusing power is necessary to increase vision or decrease eye fatigue and discomfort, proper correcting lenses are the only intelligent remedy. Glasses don't weaken the eyes. Quite the contrary.

Most persons who wear glasses do not require them permanently. When ocular fatigue is reduced sufficiently by the use of correcting lenses, or the irritability of the eyes previously aggravated by dysfunction elsewhere in the body is lessened, glasses can often be dispensed with entirely, or need be worn only during prolonged eye use.

After the age of 40, the automatic attachment of the eye camera usually progressively weakens, and glasses become necessary for close work. These, technically, have no connection with correcting

lenses which may be needed for distant sight. Different strength lenses for far and near use frequently become necessary, a difficulty which is met by using two separate pairs of glasses or double vision lenses, popularly called bifocals. Increasingly stronger glasses are usually required after 40 for close eye use, not because glasses weaken the eyes but because age continues to weaken the focusing attachment in the eye.

Eye-Bright and Elder Bark

Health superstitions have not been limited to natural substances of human or animal origin. Association remedies, such as eyeballs and eye fluids from animals, were matched in the use of plants such as the Euphosia, or eye-bright, which resembled the pupil of the eye. Its virtues for treating ocular diseases were once greatly praised.

Another plant, which has been held sacred for many years in almost all European countries because of its healing effect on the eyes, is the elder tree. Anointing the eyes with the green juice of the inner bark was also supposed to make it possible to spy on the secret actions of witches. It is a viscid, non-irritating substance which does no harm and no good. Its use in healing lotions for the eyes has been noted as recently as 1890.

Calabar Bean

Coincidences in the use of certain plants for eye treatment have occurred, connecting superstitious remedies with later, more scientific methods. The Calabar bean, for example, which was used in religious ordeals in Africa, is now employed as eserine, a highly important drug used in the treatment of glaucoma, one of the most serious eye diseases.

Seeing Spirits

The most widely used plant remedies, however, were those known as "witches' ointments," concoctions whereby the witch, magician, or medicine man tricked the mind and sight of his victim or even himself. Witches' ointments were employed to "see spirits." They contained aconite, belladonna, stramonium, hemlock, henbane, etc.—all powerful drugs capable of disarranging not

only the vision but the mind and body as well. These ingredients were mixed, of course, with such "mystic" substances as "the blood and fat of night birds," "baby's fat," etc., which lent impressiveness to the ceremonies of mixture but only irritated or infected the eyes. The drug which appears most frequently in these ointments is belladonna, or atropine, one of the important aids to modern medicine in the treatment of some eye diseases.

Bright Eyes

In bygone days actresses used belladonna or other dilating drops to change light eyes to dark by enlarging the pupils. Somewhat later, weak solutions of cocaine were used because they slightly reduced winking and thereby made the eyes appear brighter. At the present time, in the moving picture industry, less harmful drops are said to be used occasionally to relieve the eyes from intense glare.

Dilating Drops—When and Why

To determine the actual necessity for wearing correcting glasses, their proper strength, and everything else necessary to the cure of eye symptoms, dilating drops are often essential, sometimes advisable, and occasionally harmful. Only an eye physician can decide intelligently on the advisability of their use.

In the treatment of some eye diseases, such as inflammations of the iris, dilating drops may be necessary to prevent blindness. In other diseases, such as glaucoma, they may do great harm. Only a competent eye physician who understands their use is permitted to employ dilating drops. Those who are not legally allowed to use them have publicized their abuse, apparently to mislead the public and to create a false prejudice for personal gain.

In children, especially those with a tendency to crossed eyes, the use of dilating drops is imperative; in young adults they are usually necessary; and after 45, they are usually not needed to obtain proper glasses. To this general statement there are obviously many exceptions.

By enforcing eye rest for several days, dilating drops often hasten recovery, and reduce the temporary discomfort associated with new glasses. They are sometimes necessary to examine properly

the back of the eye where the first signs of many diseases of other parts of the body are sometimes found. In one patient of every three it is impossible to prescribe efficient glasses without the use of dilating drops. Eye physicians know when they are harmful. In eyes where their use can do no harm, and may do good through making possible the prescription of more efficient lenses and quicker recovery, there is but one intelligent answer: use dilating drops.

Motes and Beams

Foreign bodies do get into eyes and their prompt removal is imperative to the sufferer. Many popular methods of ridding the eyes thereof are in vogue.

Removal of a foreign substance from one eye by rubbing the other is a prevalent custom. Another much used procedure involves pulling the upper lid over the lower and blowing the nose. Both of these simple measures may dislodge small objects which are loose enough in the eye to be drawn to the corner. The suction in the tear duct associated with blowing the nose is relied upon to remove the mote from the eye. Usually such means are unsuccessful because the foreign body is lodged in the groove of the upper lid or adheres to the eyeball.

Another method for removing foreign bodies from the eye, according to current belief, is with the tip of the tongue. This remedy is as dangerous as it is ungraceful, because the germs in the mouth are often just the kind that produce the worst infections of the cornea, especially when it has been previously bruised by a foreign substance. Probably the greatest accomplishment of the National Society for the Prevention of Blindness is dissemination of the great truth that eyes should not be touched by anything that is not absolutely clean. The attempted removal of slight foreign bodies from the eyes, with subsequent infection from dirty hands, handkerchiefs, or instruments of different kinds ranging from toothpicks to finger nails, costs thousands their sight every year.

Another method of removing dust, cinders or other small objects from the eye is with a flax seed. Although foreign substances occasionally adhere to a flax seed, which is smooth, it is usually not clean and may cause infections of particularly serious forms.

Poultices of potatoes, bread, oysters or steak are favorite remedies for eyes and lids that have been injured by rough treatment. Black eyes, popularly called "shiners," are due to bleeding under the skin of the lid and, if uncomplicated, usually last about a week. They prove beyond doubt that two objects can not occupy the same space at the same time, especially when one is the eye and the other a foot. During the normal period of blood absorption, all the king's horses and all the king's men with all the poultices that have been devised can not change the normal evolution of red, blue, and blue green until finally the normal color is restored. Although hygroscopic solutions, like epsom salts, do draw water from the lids and some of the varied articles of diet mentioned as poultices act in this capacity, their lack of cleanliness increases the risk of infection, especially in already bruised surfaces.

Aggravation by wind and dust of the little red elevation at the nasal corner of the eye—called a pterygium—is popularly supposed to be an insect wing which has attached itself to the eyeball. These pterygia seldom grow far enough across the eye to obscure sight and can be removed with a slight painless operation. They are not to be confused with cataract, which is behind the pupil and more frequently impairs the vision.

Yesterday, Today and Tomorrow

Although we are living in a world where science has apparently become master, but little has been accomplished practically in defeating two of its greatest enemies. These are human gullibility and audacity, which have both played so prominent a part in the healing art. When searching for health, the urge to rely on the intangible is almost fundamental. It has been used constructively and destructively since time immemorial by those who professed to cure disease. The intelligent man of today does not wear a nutmeg suspended around his neck to cure styes; but the firms who sell electric belts, radium spectacles, eye exercisers, vitaminized eye salves, and falsely represented eye washes still do a thriving business even in times of depression. New methods of marketing the more passive confidence in recovery and the more active urge to get well are devised by each generation and usually dis-

carded by the next, if not before. For us, the methods now in vogue are apparently the best.

Through history, the confidence in recovery and the urge to get well have been linked with other fundamentals of health and happiness, with embryo medical discoveries of varying importance, and usually with crude or clever foolishness which obscured from the buyers' eyes the underlying principle of suggestion. The sooner human beings realize that premature blindness, death and disease inevitably result from misuse of the human body and mind, the sooner will ridiculous remedies cease to exist. A better understanding of the simple fundamentals of cause and effect in life is the beginning and end of the prevention of blindness.

A Course in Eye Hygiene and Sight Conservation in Sight-Saving Classes

Helen J. Coffin*

EDUCATION for the future, as well as for the immediate use of eyes, is a basic duty of the sight-saving class. This course is the result of careful estimate of pupil needs and graded capacity to learn

Introductory

Opinions differ as to just how a so-called sight-saving class functions in the conservation of sight. In this country a sight-saving class is considered to be an educational center for pupils with defective vision who are under expert medical care. These pupils may be classified in two major groups, i.e., those whose vision is low from various causes and who cannot be educated profitably in the regular classrooms with all the small print reading and the regular class equipment; and those who are myopic.

It has not been positively or scientifically proved how much, if at all, sight-saving class work has prevented or retarded the progress of myopia. Moreover, some cases of myopia prove not to be of the progressive type. There are data, however, which show that few children who attend a sight-saving class have the expected increase in myopia during their adolescent years. A little child who has a high degree of myopia, with or without normal vision, is certainly much better off from the standpoint of training in the proper use of eyes in a specially equipped sight-saving classroom under the direct teaching methods of a teacher who has made a special study of sight conservation teaching, and who knows how to adapt the school assignments to the visual needs of the individual pupil, than if he were in a regular classroom.

The aims of a sight-saving class, however, are not only to provide

* Deceased November 17, 1935.

excellent teachers and thoroughly equipped and scientifically lighted classrooms in order to educate the child with the least possible amount of eyestrain; but also to help the child learn how to conserve his sight continuously.

Children are admitted to sight-saving classes upon the recommendation of an ophthalmologist. His attention and advice for each individual case are requirements for attendance in these classes. The specially trained sight-saving class teacher follows up the recommendations of the ophthalmologist and adapts her teaching methods to fit the needs of each individual child. To the skill of the ophthalmologist and the techniques of the teacher there should be added the learning ability of the child. Through a course in eye hygiene and sight conservation the child may learn to share in the experience of saving sight. Such a course should in no way attempt to enter the physician's field of diagnosis and care, or to teach detailed ocular knowledge. It should give only the simplest facts and build up from these facts, attitudes and appreciations for the continued preservation of eyesight.

This program calls for the co-ordinated efforts of ophthalmologists, teachers, and pupils. We should include the parents, but unfortunately the child, rather than the parents, is likely to bear the responsibility for interpreting to his family his need for continuing his school sight-saving habits in suitable home activities. The co-operation existing between ophthalmologists and teachers, and a knowledge and understanding each of the other's field of endeavor, have been some of the outstanding features of sight-saving class work wherever these classes have been organized. If the co-operation of the parents and the child himself in carrying out the advice and the teaching of the ophthalmologist and teacher, respectively, could be gained, it would insure more far-reaching results of the training in sight conservation.

When sight-saving classes are first organized in a school system the co-ordination of their activities with those of the schools in which they are located, and the adjustment of the pupils within both the special group and the larger units of the school and community require all the time the teacher can spare from the preparation of the lessons and the teaching of reading, writing and other subjects. After a class is well started, however, the teacher should

consider how she can teach her particular group the wise practice of sight conservation habits and the hygienic use of eyes both in school and out.

The special objectives of a sight conservation course should be very clear in the mind of the teacher, and her teaching procedure should be carefully planned and adhered to, or else confusion will result and the outcomes be of doubtful, or even harmful, value. Among the outcomes of this teaching one should find certain attitudes. It is desirable that the child develop a wholesome attitude toward life; that he adjust cheerfully to his sight-saving class placement, and that he become a dependable "sight saver" at home. He must also know how to apply his information in life experiences, especially in choosing his play activities, his scheme for continuing his education, and his "jobs" or future career.

In Cleveland the teachers in the sight-saving classes have tried a plan for the past five years which has gradually evolved into the present course in eye hygiene and sight conservation. We are still feeling our way, not yet sure of the philosophy, the objectives, the procedure, or the outcomes which we are obtaining; but there has been some tangible evidence of gains on the part of the pupils in interest, appreciation, and attitude, and we are encouraged by these results of the teaching of this subject.

Reasons for the Course

Education is a means to a better living. It is recognized as something that should function in behavior (what one does) as well as in intellect (what one knows). Learning involves both knowing and doing and the school's aim is to build up certain desirable habits, attitudes, and appreciations which will make worthy citizens. The child acquires knowledge and develops certain skills through orderly and graded processes of instruction. By doing things the child is forming habit patterns which become an integral part of his personality as he grows from childhood to adolescence and adulthood. Unless consideration is given to the application of ideas and skills in life situations, education does not function vitally.

One of the general aims of education to-day relates to good health. While some of the other aims of education are less univer-

sal, good health habits and good health have indisputable values for all children. Before birth and until death health is a major factor in living. It affects personality, learning, and working. Children enter school presenting a wide range of individual differences, many of them traceable to health, or matters pertaining to physical traits, inherited health tendencies, congenital malformations of bodily structure, etc.

The schools have discovered that education for all calls for differentiated teaching methods and material if it is to meet the needs of all the learners. Outstanding among the differentiated types of education already provided are classes for children with the physical differences which most seriously affect their ability to learn, such as braille classes for those children who are blind, sight-saving classes for the partially sighted, and oral schools for the deaf and hard-of-hearing. The fundamental objectives of education are the same for all children, but the specific objectives for these pupils differ. Specific objectives for the partially sighted child should include those objectives whereby the child with seriously impaired vision may learn daily habits, useful skills, wholesome attitudes, and the continuous wise use and care of his eyesight. Sight conservation is an important part in the health program of these learners. They must not be permitted to acquire an education at the expense of eyesight, and when they leave school they should give evidence of ability to apply their knowledge and habits in their daily living. To this end, sight conservation for these pupils becomes a subject for educational as well as for medical treatment.

Sometimes people assume that schools have no interest in or responsibility for the behavior of children out of school. If the school does not aim to affect the child's living by affecting the habits and attitudes of the child out of school it is not recognizing one of its fundamental obligations and is not fulfilling one of its major objectives. A good sight-saving class teacher thinks not only of the methods of the classroom, where she is ever-watchful, but she knows something about her pupil's home environment, activities, and habits, and has some knowledge of and plans for suitable vocational objectives for her pupils.

It has been found, however, that the teaching of sight conserva-

tion is not effective unless recognized as a subject in the curriculum, and as such it is still in a tentative stage. Progress in medicine and surgery is dependent to a large degree upon experimentation, both in the laboratory and outside. Progress in education is dependent upon tentative courses and experimental methods of teaching. Not to recognize the need for this within limits in all classrooms would be as detrimental to progress in education as it would be to progress in science. The material for a new subject and the method of teaching it should be planned with a great deal of care and as scientifically as possible. It should be measured for worth-while values in terms of the child's needs. The best school curriculum to-day undergoes continuous change, and a course in eye hygiene and sight conservation may be expected to improve as more is learned of the needs of the children and of the outcomes desired.

Making the Course of Study

Prior to 1921, the Cleveland sight-saving classes had no very definite course of study in eye hygiene and sight conservation. The teachers of these classes were well prepared and each taught as much or as little as they might choose from a very brief outline. This covered mainly the structure of the eye and a few of the common eye diseases. The result of this informal teaching was overemphasis on certain points, repetition of the same information, as the child went from grade to grade, and in consequence an indifference often amounting to a dislike of the subject of eye hygiene. There was little evidence of the right attitudes, or of the application of sight conservation outside of school, and no indications of individual responsibility for sight conservation.

During 1929–30, a committee of six sight-saving class teachers representing the primary, intermediate, and junior high school classes, with the supervisor as chairman, commenced work on a graded course of study for sight-saving class pupils in grades one to nine, inclusive. The committee arrived at the choice of objectives for this course by a careful evaluation of all data collected from various sources, including an analysis of sight-saving class pupils' activities out of school, an analysis of sight-saving class pupils' needs, an expression of expert opinion from ophthalmolo-

gists and sight-saving class teachers, and an analysis of the sight-saving classroom habits of pupils.

The criteria upon which the objectives were selected were interest, usefulness, suitability from the point of view of pupils' learning capacity, and relatedness of the activities to the child's experience.

The committee agreed that the approach in all grades should be from the child's point of view and that the goals to be reached should be stated in terms of learning and doing.

The Plan

Since a sight-saving class is always made up of three or more grades, it seemed desirable to divide the objectives into three series each—for primary, intermediate, and junior high school groups, respectively. This provided for a rotation in the teaching of the series. The full course of lessons takes three semesters to complete. By repeating each series twice in each grade-group the new child is enabled to get information in the proper grade and the other children have some review. A choice in the sequence of the lessons in a given series is allowed and the individual teacher may select lessons which correlate with seasonal activities and classroom projects. Every teacher, however, must use the same series for her grade-group in the same semester and in the same succession.

The primary grade series emphasizes habit-forming activities, such as taking glasses off carefully, always wearing glasses if necessary, position of the book for reading, etc. The intermediate grade series emphasizes the simple facts concerning the physiology and structure of the eye and activities for sight-saving class boys and girls outside of school. The junior high school series emphasizes the application of habits and facts as related to the community and vocational adjustments of the pupil.

At first all the teachers were given the same lesson written out in full. This did not permit enough flexibility. Although the objectives remained the same it was necessary to develop different lesson units for each individual class. The same lesson was not always satisfactory even when presented to the same grades because of the difference in eye conditions and mental ages. Moreover, this subject is the teacher's opportunity to utilize skill and tech-

nique in teaching methods, and to enjoy the development of a subject which is her specialty. It must be emphasized, however, that no teacher can get successful results who does not prepare each lesson. The minimum time for the primary classes is twenty minutes, twice a week; for the intermediate, forty minutes, or two thirty-minute classes a week; and for the junior high school, forty-five minutes a week.

The Sight-Saving Council

As has been stated above, the committee wanted to make a course in eye hygiene which would function as a means of sight conservation both for the child's immediate and for his future needs. In 1931, one of the members of the committee suggested the formation of a sight-saving council as a means of motivating the study of eye hygiene and of creating an interest in and responsibility for sight saving. The conduct of this council as an integral part of our course has evolved by slow stages during the past four years. In spite of some difficulties in the practical operation of such a council, it has functioned in a very worth-while manner, not only as a part of our sight-saving course, but as a real factor in developing boys and girls with a wholesome knowledge of themselves and their abilities as well as their responsibilities and obligations to others.

The General Sight-Saving Council of the Cleveland Public Schools held its first meeting in November, 1931.* A constitution was written by a committee of pupils. Officers consisting of a president, vice-president and secretary were chosen from our student body and plans were made to have two meetings each year. In addition to the General Council, each sight-saving class organized as a sight-saving council with all pupils eligible for membership who subscribed to a sight-saving pledge and tried to live up to sight-saving standards.

Twice each year each class council sends two representatives to the General Council meetings, one meeting of which is a business meeting and the other one a program meeting. During the year the class councils work as committee members of the General Council Committees. They prepare something which can be con-

* Not to be confused with the Sight Saving Council of Cleveland, organized in 1934.

tributed to the General Council in the way of information, reports, or dramatic presentations. The reports stimulate interest and rivalry among the centers; they inspire pride and develop initiative for active participation in activities.

One of the outcomes of these programs has been a collection of sight-saving class material for the pupils to use for reference. Another is the interest the parents have developed, and the information which has been disseminated through the programs which have been offered to the parents and the public. Attendance in a sight-saving class becomes a privilege when it has so much to offer, and membership in a sight-saving council is an honor.

The class councils have permitted the pupils to learn how to conduct a meeting, choose officers, speak before others, and give schools programs for parents and visitors during Education Week. The attitude of many of the parents has changed as they have seen their children taking part before a group and talking in an impersonal and altruistic way about sight saving. Such lessons as the one based upon the objectives "To Know How Glasses Are Made," or "To Know What Games Sight-Saving Class Boys and Girls May Play with Safety" help to develop interest and appreciation on the part of parents as well as children.

The facts and information taught by the teacher in the eye hygiene lesson become the basis for carrying on the pupils' council meetings. If such a topic as "Care of Glasses" interests a class council they may work on a booklet describing and illustrating the history of spectacles. Such material when presented to the General Council at a semi-annual meeting has been carefully corrected and copied on the bulletin typewriter for reference material for other classes.

In connection also with the sight conservation work is the constant drive to prevent economic waste through broken glasses. There is an honor banner presented at each General Council meeting to the class which has the best record in the non-breakage of glasses.

Sometimes handwork is correlated with the sight conservation course and classes make puppets for a class council program. These may depict the activities of sight-saving class pupils out of school. A class has recently made large paper dolls dressed in the costumes

of the countries all over the world where sight-saving classes have been organized. In junior high school, current items, and news of prominent people in sight-saving class work, or in the prevention of blindness, appeal to the pupils in their council time. The teacher, of course, must read the reference information, but one child can prepare and present the topic to the whole group. The SIGHT-SAVING REVIEW and the *Sight-Saving Class Exchange* have furnished the teachers with excellent reference material for these short class council talks.

Conclusion

From the foregoing it is apparent that we are trying to study the child who obtains his education in a sight-saving class, including his physical and mental abilities, and his home and neighborhood environments. In the light of all of these conditions the school aims to fulfill its responsibility toward the child to the end that he may learn certain facts, acquire certain habits and skills, and develop certain attitudes and appreciations which will enable him to make satisfactory adjustments in the future as well as in the present. A boy or girl who has attended a sight-saving class should know that his eyes should always be cared for by a competent ophthalmologist, and that certain eye symptoms are warnings to seek such advice. The appreciation of prompt, expert medical attention, whether for himself or others, is an outcome to be obtained from the learning of a few facts concerning the physiology and structure of the human eye.

A boy or girl who has attended a sight-saving class should consider certain conditions and sight requirements when preparing for, or choosing work. He should be able to weigh these requirements against his individual condition and to know to whom to go for reliable guidance in making final decisions. To know what to look for in choosing work and what to avoid will help young men and women to get started in a career without the failures which lead to a sense of frustration and discouragement, to say nothing of preventing possible injury from excessive eye work and eyestrain.

Finally, the child who from kindergarten on has learned to know his limitations and has learned to make the most of all of his abili-

ties has a better chance, not only to protect his eyes, but to conduct himself in a perfectly normal and wholesome manner among his family and associates. The value of sight-saving classes would indeed be questionable if emphasis on sight conservation spared the eyes and spoiled the child. Sight-saving classes should aim to develop the whole child, and the teachers should respect the personalities of these children particularly as they develop into adolescence.

In the education of these children with their medical, vocational, and social problems, the schools need the advice of all of the experts in these various fields: the ophthalmologist, the vocational counselor, the psychiatrist, and the visiting teacher. With this advice a well-integrated curriculum for the visually handicapped child may be developed in which the teaching of sight conservation should contribute to the learner's ability to adjust to life's situations.

Relative Visibility of Print in Terms of Illumination Intensity

Matthew Luckiesh, D.Sc., and Frank K. Moss

HOW much light? What kind of light? are questions that interest ophthalmologists, school officials, business and factory directors—and parents. Because opinion varies widely, the REVIEW presents this as the first of a series of articles on illumination

HUMAN beings functioning as human seeing-machines are interested in three fundamental phases of seeing. These are the visual task, the eyes and the visual sense, and light[1] and lighting.[2] The latter phase is universally controllable for the purpose of improving conditions for seeing. It may be subdivided into three phases for analysis. These are quantity of light, quality or spectral character of light, and quality of lighting or distribution of light and brightness. This discussion pertains primarily to the factor of quantity of light since, for practical reasons at the present time, we are obliged to accept the spectral quality of tungsten-filament light whether it is ideal or not.[3] Also, we are obliged to accept general, diffuse lighting as a practical means of lighting most classrooms at the present time. In this manner the discussion is confined solely to intensity of illumination, which is always a factor of primary importance in seeing. Hence adverse factors[4] of lighting such as glare or high brightness-contrasts within the field of view are not considered since they are preventable.

The most obvious result of an increase in the intensity of illumination upon an object or visual task is the corresponding improvement in visibility. In addition, there are important psychophysiological phenomena concomitant with critical seeing which are observable only after a more or less protracted period of visual effort. It is only recently that the latter have been appreciated

and measured. Hence it is to be expected that lighting recommendations of the past have been inadequate since they were formulated from a viewpoint of vision rather than seeing. For many decades a science of vision has been developing but seeing involves much more than the conception of eyes merely as optical devices. It involves a consideration of seeing as an activity of the human being operating as a human seeing-machine in which stimulation and impression, efficiency and safety, strain and fatigue are vital factors. Thus light and lighting, as well as eyes and eyeglasses, are to be regarded as "tools" for seeing.

It has been definitely established that intensities of illumination as high as 100 foot candles* are desirable for such a visual task as reading ordinary black print upon white paper. This conclusion is firmly based upon the results of extensive researches pertaining to the psycho-physiological effects of seeing and is in harmony with philosophical considerations and experience. Some of the more important criteria which we have used for determining ideal intensities of illumination are summarized as follows:

Momentary Criteria of Visual Efficiency[5]—visual acuity; contrast sensibility; speed of retinal impression.
Integrative Phenomena[6, 7, 8]—nervous muscular tension; ocular muscle fatigue; heartrate changes, etc.
Philosophical Considerations[4]—evolution of the visual sense under daylight intensities of illumination.

Quantitative data related to these criteria are presented in Fig. 1. Thus visual acuity, as a primary factor in reading, increases from 100 per cent at 1 foot candle to 170 per cent at 100 foot candles. It is now known that intensities of illumination must be doubled in order to produce an obvious and significant improvement in the visibility of an object. In other words, foot candles must be increased in geometric ratio in order to improve seeing in arithmetic ratio. The failure to think of foot candle intensities in terms of a geometric scale usually results in over-estimating the value of a definite increase in the intensity of illumination. It is also evident from the data of Fig. 1 that 100 foot candles are desirable for read-

* The foot candle is the unit of intensity of illumination and is equal to the density of luminous flux upon a surface placed at right angles to the light rays at a distance of 1 foot from a light source of 1 candlepower. (An ordinary candle placed 1 foot from a surface will illuminate that surface to an intensity of approximately 1 foot candle.)

ing when the value of the lighting is appraised upon a basis of ease and comfort. Obviously, far lower levels of illumination would be suggested by a narrow consideration of mere ability to see. The goal of a science of seeing is to provide conditions for easy rather than barely seeing.

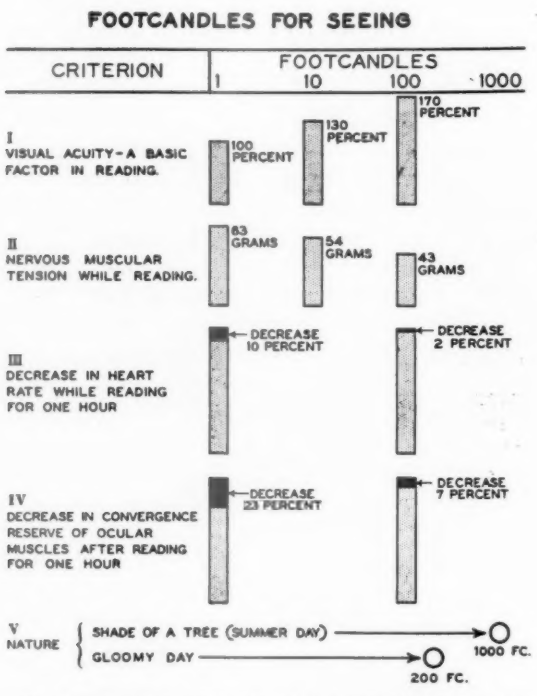

Fig. 1.—Fundamental criteria for appraising the relationship between intensity of illumination and ease of seeing.

By numerous and diversified researches we have definitely established the fact that the optimum visibility of details of a black object upon a white background is obtained under an intensity of illumination well above 100 foot candles. Hence any level of illumination which may be recommended for a particular visual task upon a basis of visibility data is usually a result of a com-

promise between visual and economic or engineering factors. Obviously, such a recommendation is not significant in an absolute sense. However, if a given intensity of illumination is considered to be acceptable or satisfactory for a certain visual task, it is possible to specify levels of illumination for other tasks upon a rational basis. This eliminates the prevalent empiricism, inconsistency and ambiguity in foot candle recommendations. A new instrument, designated as a visibility meter, is now available for this purpose.

This instrument, illustrated in Fig. 2, consists essentially of two

Fig. 2.—The Luckiesh-Moss Visibility Meter. A new instrument for appraising the visibility of various objects and visual tasks and for specifying practicable levels of illumination for visual tasks upon a rational basis.

colorless photographic filters with precise circular gradients of density which may be rotated simultaneously in front of the eyes while looking at an object or while performing a visual task. The observer holds the instrument in approximately the same position that eyeglasses are worn and, with a finger of the right hand, slowly turns a disk which rotates the circular gradients until the visual threshold or limit in the performance of the visual task is reached. Individual measurements of visibility may be made in a few seconds even by untrained observers. Obviously, the reliability of the results obtained with the Visibility Meter are proportional to the number of observations involved. Actually, in the measurement of visibility or of seeing, fluctuations in human variables necessitate a series of several observations for each observer.

The instrument has two rational scales which are based upon many years of research. These are: (1) relative visibility—scale range, 1 to 20, and (2) foot candles recommended—scale range, 1 to 1,000. In all the researches and calibration tests upon which these scales are based, subjects with average normal vision were used. Therefore, other factors being equal, the Visibility Meter is also a practical test of the part that subnormal vision may play in everyday seeing.

The visibility scale has an absolute rational basis founded upon the maximum ability of persons with average normal vision to recognize the details of a simple describable object of definite size and contrast. In an absolute sense a setting at unity on the visibility scale represents the limit of average normal vision under favorable conditions for seeing. The scale value "2" indicates that the object or task is twice as visible as the smallest object which can be recognized by persons with average normal vision. These scale values not only represent relative visibility of objects or visual tasks but also can be interpreted as factors of safety in seeing. Certainly there is a great need for introducing known factors of safety into seeing because of the great variation in the ability of a human seeing-machine due both to internal human conditions and external physical environment.

The scale values of recommended foot candles have no obvious relation to the scale values of relative visibility. The former are rational among themselves in a relative sense. However, the actual values are an arbitrary compromise between the foot candles necessary for barely seeing and the enormously higher foot candle levels for easiest seeing as indicated by our researches in seeing. That the scale of recommended foot candles is conservative is attested to by the fact that it is based upon the visibility of reading matter printed with 8-point (Bodoni) type and black ink on excellent white paper and illuminated to an intensity of 10 foot candles without any preventable glare present. This task corresponds to the scale value "10." Our researches in several directions have already indicated that at least 100 foot candles are desirable for that particular visual task. A scale value of "20" for another task under the same intensity of illumination as the former basic task indicates that it should have 20 foot candles in order to be as visible

or as easily performed as the foregoing standard task (8-point black print on white paper at 10 foot candles).

If all visual tasks are studied with the Visibility Meter at the standard level of 10 foot candles, the scale reads directly the recommended foot candles whose actual values are an arbitrary compromise between ideals and practical engineering and economic factors. In practice when the actual (A) foot candles on the task being studied differ from 10 foot candles, the scale reading of recommended foot candles should be multiplied by the ratio A/10 or 0.1A to obtain with sufficient accuracy the true value of our recommended foot candles for that particular task. Wherever practicable in studies of foot candle requirements for various visual tasks, a standard intensity of illumination of 10 foot candles should be used so that the recommended foot candles can be read directly from the scale. The basic principles underlying the scales of the instrument have been described in detail elsewhere.[9]

Since reading is a universal visual task and is the most common of the prolonged visual tasks of school work, a determination of the relative visibility of print of various sizes is correspondingly important. Although relative visibility may be expressed in terms of any one of the four fundamental variables of the visual threshold,[5] the factor of intensity of illumination is the most significant one, for present purposes, since this factor is completely controllable. Also, it is the factor in seeing which is usually inadequate in practice because lighting development in the past has not been based upon a science of seeing.

The relationships between type-size and intensity of illumination, for conditions of equal visibility, are presented in Table I for four usual sizes of Bodoni book type. The measurements were made with the Luckiesh-Moss Visibility Meter. The Bodoni type-face was selected for test purposes because of its prevalence in typography.[10]

The printed matter was placed at a distance of 14 inches from the eyes of the subjects and uniformly illuminated to 5, 10, 20 and 50 foot candles, respectively. These levels of illumination correspond to four different standards of "ease of seeing." A series of paragraphs printed in 6, 8, 10 and 12-point Bodoni type were read under each level of illumination. The subjects were instructed to

adjust the Visibility Meter, in each case, until the threshold or limit in ability to read the printed matter was determined. The intensity of illumination required upon the several sizes of type in order to produce conditions of equal visibility was then obtained from the scale of Recommended Foot candles. Since the instrument was calibrated upon the assumption of a definite type-size and level of illumination as a standard, the values indicated by the instrument required correction when the conditions under which the measurements were made were different from those adopted as standard.

TABLE I

Each intensity of illumination presented represents the mean of 90 observations obtained from 10 adult subjects possessing normal or near-normal vision.

Standard of ease of seeing	*Foot Candles on Printed Matter*			
	12-point	*10-point*	*8-point*	*6-point*
5 Foot candles on 12-point type...	5	7	10	17
10 Foot candles on 12-point type...	10	15	21	36
20 Foot candles on 12-point type...	20	28	42	68
50 Foot candles on 12-point type...	50	71	93	167

It will be noted that 6-point Bodoni type is as visible as 12-point type when the intensity of illumination upon the smaller size is about three and a half times that upon the larger size. In general, this relationship between type-size and intensity of illumination is independent of the standard of ease of seeing. Furthermore, deficiencies in type-size, at least for the sizes between 6-point and 12-point, may be compensated by increases in the level of illumination which are practicable from the standpoint of illuminating engineering.

Obviously, it would also be possible to investigate the relative visibility of various kinds of printed matter when the latter is viewed by subjects possessing various degrees of subnormal vision. For example, the relative visibility of text matter used in sight-saving classes and read by children with subnormal vision might be compared to the visibility of the usual textbooks when read by children of normal visual ability. Certainly the former class needs even more visual assistance, relatively, than the latter; and the

Visibility Meter technique offers a means for appraising these factors upon a reliable quantitative basis.

Obviously there are two cardinal intensities of illumination for any specific visual task. One is the very low level corresponding to barely seeing. The other is the very high level corresponding to easiest seeing. Certainly no one would recommend the former for general use. Only in recent years has science attempted to establish the foot candle levels for easiest seeing. However, we already know that, for reading, they are of the order of daylight intensities outdoors in the shade. In general this ideal can scarcely be reached in one step from present crude lighting practice. Therefore, the question arises, How large should the present step be? Various persons will weigh differently the various factors involved. Habit and narrow economics are generally over-emphasized. The cost of lighting must be evaluated anew in the light of the new knowledge of seeing and human welfare which alters past opinion of the value of good lighting and the cost of poor lighting from the viewpoint of conservation of human resources.

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The Causes of Blindness in Children*

Conrad Berens, M.D., C. Edith Kerby, and Evelyn McKay

THE direct relationship between causes and prevention of blindness is brought out in a factual presentation of findings made in 20 schools for the blind

A STUDY of causes of blindness in 2,702 children in schools for the blind, made by the Committee on Statistics of the Blind, is presented in the hope that it will stimulate medical research and that more reliable data will be obtained for use in the planning of programs for prevention of blindness.

The eye examination record form used in this study requires the minimum of medical data essential for the intelligent solution of problems relating to the child's education, vocational guidance and medical care, and for statistical purposes.

Importance of Etiology

The etiologic cause of blindness is stressed because the ophthalmologist usually tends to record his diagnosis in terms of the eye lesion only, even when he has determined the underlying etiologic factor. From the point of view of social programs, etiologic information is of paramount importance. A public health nurse or medical social worker may be of assistance in assembling known facts concerning a case.

If, at the time of onset of blindness, a complete summary of information concerning the case should be filed with the state commission for the blind or the department of health, valuable statistical data on causes and incidence of blindness would become available. This full information would also aid in plans for the child's welfare.

* Abstract of the paper presented at the Section on Ophthalmology, Annual Meeting of the American Medical Association, June 10–15, 1935; the complete paper is published in the *Journal of the American Medical Association*, December 14, 1935.

Age Group

The age group studied is about that usually found in elementary and secondary schools, hence only conditions occurring in children will be found.

Classification by Amount of Vision Remaining

Since no definition of blindness was found upon which ophthalmologists and workers for the blind throughout the country would agree, cases were divided into groups on the basis of visual acuity. Of these pupils, 12.6 per cent had vision better than 20/200, and about 4 per cent had better than 20/70, a degree of sight which is usually designated as the maximum vision for sight-saving class pupils. Pupils with too much vision for tactual training should be referred to sight-saving classes or the regular grades by ophthalmologists, who should also be consulted in adjusting the environmental conditions and teaching methods in schools for the blind to safeguard the remaining vision.

Classification by Cause

Data on causes of blindness are presented according to an etiologic and a topographic classification, the plan of classification being similar to that of the Standard Classified Nomenclature of Disease.

Etiologic Classification

Of the six main headings in the etiologic classification, the "congenital and hereditary" group accounts for more than half (51.1 per cent) of the total cases. There is need for further study to determine the etiology of congenital defects and methods whereby they may be prevented. Routine Wassermann tests would aid in making diagnoses of prenatal syphilis and study of family histories would indicate the definitely hereditary cases.

"Infectious diseases" constitute the second largest group (28.6 per cent). Ophthalmia neonatorum, with 10.7 per cent of the total cases, is deplorably high and indicates the need for continued preventive effort. The percentage due to syphilis (5.3 per cent) is believed to be greatly understated, due to incompleteness of the information on etiology. More routine use of Wassermann

tests and adequate treatment would prevent much unnecessary blindness.

"Traumatic and chemical injuries" are the third largest group (7.8 per cent). "Neoplasms," "non-infectious systemic diseases" and "toxic poisonings" occur very infrequently among children.

Topographic Classification

Affections involving the entire eyeball constitute the largest group of topographic causes (31 per cent). These are largely the developmental anomalies, the remainder being due to infectious diseases and trauma.

Affections of the lens (cataract 15.7 per cent and dislocated lens 1.4 per cent) comprise the next largest group. They are almost entirely congenital. Study of the case records shows that, except where the ophthalmologists are undertaking the corrective work voluntarily, recommendations for operations are, in many cases, not being carried out. This is due to lack of facilities for surgery, refractions, etc., and to lack of trained personnel for follow-up in the homes.

Optic nerve affections occur in 16.7 per cent of the cases. The etiologies of these cases are reported as "congenital and hereditary" in 42 per cent, "infectious diseases," principally syphilis and meningitis, in 27 per cent, and "neoplasms" in 9 per cent.

Among affections of the cornea, ulcerative keratitis (10.3 per cent) due chiefly to ophthalmia neonatorum, and interstitial keratitis (2.4 per cent) due to syphilis are most important.

Many cases involving affections of the choroid and retina were only indefinitely classified as to etiology. This group needs more research.

From this analysis it is evident that the assembling of sound and consistent statistical information on the causes of blindness in children may have considerable significance in shaping a program of preventive ophthalmology, in illustrating the effectiveness of preventive methods used, and for teaching purposes.

Conclusions

1. More ophthalmologic service is required for children in schools for the blind if much blindness is to be prevented and many

children are to be removed from the blind group and placed in the seeing and partially seeing classifications.

2. Public health nurses or medical social workers should be available to supplement medical service.

3. Continued effort should be made to reduce the amount of ophthalmia neonatorum.

4. Since the "congenital and hereditary" causes apparently account for over 50 per cent of the blindness in schools for the blind, it is imperative that more accurate knowledge of etiologic factors be secured as a basis for adequate preventive measures.

5. Because syphilis is specified as the cause in 5.3 per cent of the cases and is probably also responsible for a large proportion of the "congenital" cases, better methods of prevention and treatment of syphilis must be insisted upon.

6. Diseases of the choroid and retina will require much fundamental research before the etiology can be stated specifically and blindness prevented by direct attack on the underlying cause.

7. Although only 7.8 per cent of blindness was attributed to trauma, educational efforts and improved safety measures should be continued.

8. Because the visual acuity of the pupils was better than 20/200 (in 12.6 per cent) and was better than 20/70 in nearly 4 per cent, ophthalmologists should insist that more attention be paid to educational opportunities for children with serious visual impairment, but not actually or educationally blind.

These statistics on causes of blindness are probably better than those previously available. However, this study clearly indicates the need for the co-operation of ophthalmologists and all concerned with eye diseases and blindness in obtaining more reliable statistical information, especially in regard to exact etiology. We believe that the members of the Section on Ophthalmology of the American Medical Association will continue to co-operate as they have in the past.

Highlights of the Discussion

"Congenital and hereditary diseases present a different problem. There are too many instances where many children in the same family are pupils in the Blind School. Congenital cataract,

microphthalmos, uveal coloboma, dislocated lens, albinism and syphilitic eye diseases could all be decreased in numbers materially by a concerted personal campaign of education in these families, without requiring the legislative measures of birth control, sterilization and regulations against intermarriage. It is through ignorance that many of these families continue to bring blind children into the world, often against their will."—Dr. Albert D. Frost, Columbus, Ohio.

"While one of the chief purposes of this paper is to stimulate an effort to secure honest and reliable statistics concerning the etiologic factors that have to do with blindness, it also serves the purpose to illustrate the fact that much relative relief can be given to many who are included within the group regarded as blind, as this pertains to schools for the blind. On the other hand, nothing is more reprehensible to me than some of the unnecessary 'whittling' to which some of these children are occasionally and indifferently subjected."—Dr. Thomas B. Holloway, Philadelphia, Pennsylvania.

"Some two years ago four of us made a survey of the Illinois State School for the Blind . . . an admirable institution which has been going on without ophthalmological consultation for some little time. We found that of the 246 pupils in that school, 26 per cent were there unnecessarily, that their vision was of such quality that they could continue their education in the seeing world, or could be restored to the seeing world by simple remedial measures. Another 25 per cent we estimated could be restored to the seeing world by surgical remedial measures, and in the past two years we have tried to carry out those remedial measures. As a result we have decreased the population of the Illinois School for the Blind by about 40 per cent.

"To take up the space that was left there, the State Government very kindly gave us authority to introduce two sight-saving classes available only to children who live in communities that have no sight-saving classes of their own. . . . Although the expense of conducting these sight-saving classes is greater than the expense of conducting similar classes in the city, still it puts within the range of those who are not so situated as to be able to take

advantage of the sight-saving classes, the advantages of this education."—Dr. Harry S. Gradle, Chicago, Illinois.

"I was the originator of the definition which secures admission to the blind pension scheme, and it was an extraordinarily difficult thing to devise a practical definition. There wasn't any good saying that a person has one eye 6/60 and the other 6/30, because some of them might do very well and others with much better central vision and a limited field were much worse off than these people with good fields and 6/30. Consequently, the definition that we ultimately adopted was 'too blind to be able to perform work for which eyesight is usually essential.' "—Mr. Leslie Paton, London, England.

"One large group of cases that we immediately encountered (at Perkins Institution) were those who had been sent in with a diagnosis of congenital amblyopia. On more careful examination, it was found that a small group of these people had completely normal fundi. On going into the history of these patients, the interesting thing was found that birth injuries were associated with a great many. I believe that this immediately takes these people out of the classification of hereditary blindness and puts them into the classification of birth injuries."—Dr. T. Gundersen, Boston, Massachusetts.

"Of course I think we all recognize the fact that, from a financial standpoint, our states are responsible for this problem. . . . Active interest in the problem from a scientific standpoint has been definitely lacking. . . . Surely it is true that if we as ophthalmologists do not sponsor in an active way the problem that confronts these children, who in heaven's name will do it? I think that these blind schools sponsored and maintained by the states should be the active workhouse for this problem. . . .

"One other thing of interest to me is this problem of congenital blindness. I believe it can be solved when enough information is at hand to give positive advice as to the best way out. I know personally that in our schools in North Carolina over one-third of the population in those schools at the present time

are children whose parents, either one or both, attended a similar institution. I believe that these parents do not want to have these children, but they have not had any advice and naturally it should not surprise us to see from three to ten children coming into our institution from the mother who was educated there and married for her rightful companionship."—Dr. V. H. Hicks, Raleigh, North Carolina.

Editorial

Helen J. Coffin

THE death of Helen J. Coffin, supervisor of sight-saving classes in Cleveland, and contributor to this issue of the REVIEW, comes as sad news indeed to those who knew her personally and to those who knew her through her valuable contributions to the progress of sight-saving class technics. The REVIEW has always considered it a great privilege to be able to present Miss Coffin's articles, which are a living record of her directness, her keenness, her sincerity, and her idealism. The following tribute of Dr. S. H. Monson, of Cleveland, who was closely associated with her in her work, expresses the feelings of everyone who knew her, or of her:

"It was with a feeling of great personal loss that the many friends of Miss Helen J. Coffin learned of her death, which, following a brief illness, occurred in Cleveland on November 17, 1935.

"Since 1922 she had been supervisor of the sight-saving classes in the Cleveland Public Schools, which, under her able direction, have become recognized amongst the foremost in this country. Her intimate knowledge of the needs of sight-saving classes and the methods for teaching the children enrolled in them, was recognized and appreciated by those most closely associated with her in the work. No new method was adopted until it has been carefully considered and medical advice sought as to the possible harmful effect upon the eyes.

"Vocational guidance was a subject of great importance to her, and she followed with keen interest the lives of the children after they had left school and kept in personal touch with a great many of them.

"She took a great interest in the question of proper illumination and was a member of the Executive Committee of the Cleveland Sight-Saving Council. It was due in great part to her efforts that one of the first sight-saving classrooms equipped with high intensity lighting was installed in Cleveland. Lately she was devoting

considerable time to the study of the relationship of illumination to the size of type.

"By her graciousness and charm she endeared herself alike to her teachers and pupils, and her loss will be mourned not only by her friends but by all who have the interest of sight-saving classes at heart."

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

The Eye Examination in Industry*

Rehabilitation begins with prevention. Not only should examination be given before a man starts work, but periodic check-up, especially in certain occupations, should be made. The periodic check should be thorough. There is a difference between a casual and a thorough examination.

What should constitute a thorough eye examination? How thorough such an examination should be, would, of course, depend on the job. For instance, Dr. Hart E. Fisher of the Chicago Rapid Transit Company, examining the elevated lines' employees, makes three classifications: Class I—motormen, switchmen, signalmen, and towermen; auto truck drivers and motor bus operators; these all must have 20/20 vision without glasses in each eye, normal color perception, good fields and depth perception. Class II—conductors, regular and extra guards, etc., must have 20/20 in one eye, and 20/30 or better in the other eye, with normal color perception. Re-examination is made in both these classes every two years. Class III—station platform guards, crossing flagmen, shopmen, laborers; must have combined vision of 20/30, and not less than 20/40 in one eye without glasses, and normal color perception.

Each eye should be tested separately with the Snellen chart at a distance of 20 feet with good illumination—with and without glasses. If the employee cannot see the largest letter on the chart at the 20-foot distance, he should step toward the chart until he can see it. It should be seen by the normal eye at 200 feet distant. If he has to come to within 5 feet before he can

* Excerpt of the paper, "Rehabilitation After Injury to an Employee's Only Good Eye," presented at the National Safety Council Annual Congress, Louisville, October, 1935.

see it, the vision is recorded as 5/200. Usually, 20/200 is taken as industrial blindness. In some states, however, allowance is made for errors of refraction correctable with glasses. In these states I would not be industrially blind, as with my glasses I can read the 15-foot line of letters at the 20-foot distance (V. = 20/15).

To continue with the examination: notations should be made of asymmetry of the face, protrusion of one or both eyes, size, shape and reactions of the pupils, colors of the eyes, movement in all directions and in convergence, the condition of the lids and the lining of the eyes, and the presence of pus or mucus in their corners. In the interior of the eyes, the optic nerve head is noted, its color, shape and irregularities, and the vessels that pass from and to it. These latter are traced outward into the periphery of the retina. This can be satisfactorily done only with the pupils enlarged. The fields of vision or side vision is tested with a target and screen or perimeter. (See case report below.) The simultaneous use of the two eyes to perceive depth should be recorded, and the percentage of fusion noted.

Naturally each employee does not need such a searching examination. Many of these tests can be made by well-trained technicians with a reasonable consumption of time, and are of value to the doctors who must judge the fitness of the candidate for the job.

The reason I spend time talking of these things is that I do not want you to be satisfied with cursory examinations or a cursory explanation of a blind eye. Let me illustrate by citing an example: Mr. A. H. (14156), a man 45 years of age, seen September 14, 1933, had been working for one of the railroads near Chicago. He was struck in the back of the head while hanging on to a car and waving a lantern, about June, 1932. He was knocked off the car and rendered unconscious, and by accident found a few minutes later by the head light of an engine. He was examined three weeks later, and the central vision found normal in each eye. *No fields of vision were taken.* There was no evidence of syphilis, but the reflexes were slightly sluggish. Some 8 or 10 years before the Wassermann test had been reported negative. Three months after the accident, he got a cinder in the left eye, and found he could not see well with the right eye, since which time the right vision had become progressively worse. Twice during his first interview with me he strenuously denied ever having seen double, but later admitted that he had been seeing double for about six weeks. He denied infection, and all subjective and objective symptoms of syphilis. He used tobacco in moderation, smoking about one package of cigarettes a day.

His vision in the right eye was only hand movements at one foot. In the left eye, his central vision

was normal, but his fields were contracted to 70 degrees temporally, 40 degrees above, 50 degrees nasally, 50 degrees below, and colors within the 5 degree circle.

He had all the physical signs of tabes, a syphilitic infection of the brain and spinal cord.

I saw him again about six months later, at which time he could see light only in certain fields with the right eye, and count fingers at one foot in certain fields with the left eye.

In this particular instance it would have been very wise for the doctors to have taken the fields of vision and the muscle balance at regular intervals, before he was injured. Repeated Wassermann tests might also have been a safeguard, although one must not rely 100 per cent on the reports of the Wassermann test.

Thirty-five hundred dollars were paid by the company in compensation; $500 in doctor bills. This money could better have been spent in making thorough examinations at frequent intervals; it would have paid for a complete medical policy for the entire company for an entire year, and it would probably have saved the man's sight and his mind. As it is, the man and his dependents will be state charges for many years.

Many of the routine tests included in a survey can be made by well-trained technicians who have not had medical training. Surveys of employees cannot be properly evaluated by non-medical men for the simple reason that their education has been inadequate. Where it is desired to have a survey, and a qualified medical man is not available, one should get the next best, recognizing, of course, his limitations.

Recently I heard about an employee who got soap in one eye, and found he could not see with the other. The history was that, as a result of a slight blast of air from an air hose, the retina had become detached. After several operations the eye was removed. A report was never made of the contents of the eye. Two years later the man died of a brain tumor, the characteristics of which resembled very closely a tumor of the eye. In the meantime, the man had been paid for the loss of one eye. The point is this: there was undoubtedly a tumor (cancerous growth) in the eye causing the detachment of the retina which proper medical examination should have revealed. Had that eye been removed early and examined for cancer, suitable treatment could have been instituted at once and the man's life saved. The cheapest treatment of human ailments is careful management by the best doctors.

Glaucoma is a disease which is much more frequent in late life, particularly in those who are worried from one cause or another, or in those who have a family history of glaucoma. It is a disease which may creep on a person without any

warning, and so rob him of sight that one eye becomes industrially blind before he is aware of the fact. It seems to seek out the most valuable employees. Study of the fields of vision is of great importance in diagnosing this disease. Such safety measures reduce the need for rehabilitation.

Many other diseases, such as syphilis, retinitis pigmentosa, Bright's disease, diseases of the white cells and the red cells in the blood, blood vessel and heart diseases, etc., can rob a person of the use of one eye without the employee or employer being conscious of the fact. These employees are potential dangers, and great precautions should be taken with their remaining sight. Thorough physical examinations at frequent intervals will reduce accidents to the minimum. As a result of such examinations, employees may be better placed where they will not harm themselves or others. Early treatment affords the best chance of avoiding blindness and the resultant need for rehabilitation.

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Hereditary Blindness

Loss of sight which is attributed to heredity deserves serious and thoughtful consideration. Facts warrant the conviction that much might be accomplished were it possible to exercise control in this field. It is useless to point out that all hereditary difficulties could be eliminated in one generation if those predisposed towards blindness by their genetic constitution would refrain from marriage or from the bearing of children in whom the defects would be carried on either as recessive traits or as dominant characteristics. Without recourse to positive and drastic measures this goal can hardly be attained for an attempt to prevent merely by verbal appeal the marriage of, or bearing of children by the number of individuals concerned, would be as ineffective as it is simple.

But the reduction of blindness from hereditary causes lies within the realm of the possible and should be effected. We have now much information about hereditary blindness. Dr. J. Myles Bickerton stated in a paper read before the Eugenics Society in England in March, 1932, that "we know more about the hereditary diseases of the eye than about those of any other organ, and for the good reason that, being the most important and complicated of our sense organs, its slightest defects cause marked disturbances of functions."[1] He estimated that 24 per cent or nearly one quarter of all blindness could be prevented by the elimination of hereditary causes.

Not long ago Perkins Institution with the assistance of Dr. Clyde J. Keeler, research fellow in heredity in the Howe Laboratory of Ophthalmology of the Harvard Medical School, prepared for the Third International Congress of Eugenics an

exhibit showing the extent to which heredity apparently operates as a factor in the causation of blindness. Leading causes of blindness, indicated by Dr. Best[2] as probably hereditary because of the fact that those enumerated had blind parents, were selected for study.

From the material assembled it was estimated that cataract was responsible for over 50 per cent of the cases falling within this category, glaucoma for about 22 per cent, and optic nerve atrophy for about 17 per cent, and cancer and other neoplasms, myopia, amaurosis, hydrophthalmus, infantile glaucoma and retinitis pigmentosa accounting for the remaining cases. While Dr. Best admits that we cannot know with exactness just how much of this blindness is of a hereditary character, the causes enumerated account for slightly under 30 per cent of all loss of sight; "yet," he adds, "this portion presents a serious problem, and deserves full attention."[3]

As the major cause in this classification, cataract, an opacity of the lens, deserves first consideration. Preparation of the data for the exhibit involved a study of the Perkins records of the past one hundred years. Genealogies constructed on the basis of the study revealed startling evidence of the persistence of cataract through many generations. In one instance cataract was found in 24 of the 50 members of three families who had intermarried during five generations. Nine of these individuals attended Perkins Institution. Statistics presented by Best state that the hereditary influence of cataract is more marked among those of close relationship, and that the probability of its appearance in the child is 50 per cent when both parents are affected and 42.1 per cent when only one parent is affected.[4] While there is no remedy for simple cataract, operation involving extraction of the lens will in the majority of cases restore useful vision with the aid of glasses. Secondary or complicated cataract, however, responds very unfavorably to treatment.

Glaucoma, the second cause listed, is not a disease as such but is, as near as can be ascertained, a constant or periodic increase in intraocular pressure exerting a force on the optic nerve head hollowing it out in the form of a cup and eventually killing the delicate nerve fibers and destroying sight. If detected early enough, as is possible with acute cases but rarely with chronic ones, an operation may prevent the loss of vision. Glaucoma is transmitted through direct inheritance in greater proportion than through indirect.

Optic nerve atrophy, the third cause, often involves complete blindness through the degeneration of the optic nerve. Its elimination involves a knowledge and control of this degeneration. One form is known to be of a definite hereditary nature. It is also known that the

greatest proportion occurs through indirect inheritance. This portion is 38 per cent while direct heredity, with one parent affected, accounts for only 6.4 per cent.[5]

These three causes account for 23 per cent of loss of sight according to Dr. Best's figures.[6] To this per cent must be added the toll of blindness brought about by the other causes listed as probably hereditary in character. As each cause is under one per cent there is little need to give fuller thought to them here, except to affirm that all of these causes added together offer an abundant opportunity for the reduction of blindness through control.

Studies showing the action of heredity throughout many generations are numerous. Of 939 children for whom case studies were made from the Perkins records 275 or 29 per cent showed defective ancestry or had brothers or sisters who had defective vision. Census findings reveal that the percentage of blind individuals having blind relatives, parents or siblings, varies from 4 per cent to 30 per cent. The situation is further complicated by the fact that various forms of hereditary blindness do not manifest themselves until comparatively late in life, frequently after children have already been born. From these facts it will be seen that little can be done to alleviate conditions among those whose sight has been destroyed or impaired by hereditary causes. Another generation, however, can and must be protected by the adoption of preventive measures.

Eugenists have brought emphasis to bear on a comparatively new aspect of the problem of blindness which is full of promise. They would try to control the transmission of the factors which predispose individuals to the loss of sight. While several methods for the realization of the aim of eugenics present themselves, selective sterilization is claimed to be the most effective and the most humane. Knowledge of the difficulties encountered in attempts to secure legislation making this practice legal for such social handicaps as feeblemindedness, to say nothing of putting into action laws finally passed, leads to the conclusion that compulsory sterilization holds little immediate hope.

However, positive results might well follow the acceptance of the following pledge which has been recommended as a means of popularizing voluntary sterilization:

> Realizing that I am handicapped by a hereditary condition of the eyes known as ..... which condition has appeared in at least ..... of my relatives, and further realizing the grave danger of transmitting my ocular condition to future generations, now therefore I, ... do solemnly pledge myself not to marry without first presenting myself for surgical sterilization.
>
> I take this pledge of my own free will without reservation, to the end that I shall not be responsible for

bringing into the world other lives so handicapped as mine.

Signed.....
Age.....
Date.....
Address.....
Witness.....

Control of the situation through discouraging marriage offers little positive hope. While there is a strong sentiment against intermarriage of blind persons, it is based more on economic reasons than on eugenic. As a matter of fact, there is no reason why a blind person should not marry unless the loss of his or her sight is due to a transmissible cause. In this respect schools for the blind have a direct responsibility. Children whose blindness is hereditary should receive full information concerning the transmission of constitutional defects so that on leaving school they will be fully aware of the factors which should be considered by them when they contemplate marriage. Even here control is gained not through the prevention of marriage but in avoiding the procreation of offspring.

The attention of those in charge of schools for the blind is brought over and over again to the many children who ought never to have been blind and to the families which by their propagation are steadily increasing the ranks of potentially blind individuals. A splendid opportunity for effective work here presents itself. Adequate records of children admitted to schools for the blind should reveal families having hereditary tendencies toward blindness. Timely action might well prevent the birth of more blind children in these families. Certainly the appearance in a school of the children of former pupils and of as many as four brothers and sisters should not be ignored.

Intelligent action would involve the development of a comprehensive program for field work with the full co-operation of state authorities. To some this suggestion might seem to indicate a willingness to fall short of the goal. But to arrest an evil before it has run its full course, while perhaps a poor substitute for complete prevention, is nevertheless a great step toward the attainment of our aim. If support for such an attempt were enlisted, we should feel inclined to attach major significance to it as one more index of the change of attitude from intolerable, passive acceptance of blindness to active interest and control of it.

GABRIEL FARRELL
Principal, Perkins Institution and Massachusetts School for the Blind

References

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2. *Blindness and the Blind*, Harry Best. New York. Macmillan Company. p. 60.
3. *Idem*—p. 78.
4. *Idem*—p. 65.
5. *Idem*—p. 65.
6. *Idem*—p. 60.

Note and Comment

Annual Meeting and Conference.—The annual meeting and three-day conference of the National Society for the Prevention of Blindness, which was held in the Society's headquarters in Rockefeller Center, December 5, 6 and 7, brought together with united aim workers for the conservation of sight, medical social workers, leaders in the field of safety, and representatives from the public health nursing groups from New England and the Middle Atlantic States. Representatives of various organizations registered as coming from Minnesota, Missouri, Canada, Michigan and Virginia. "Medical Social Work in the Prevention of Blindness"; "Prevention of Blindness Responsibilities of Official and Volunteer Agencies"; "The Problem of Fireworks Accidents"; and "The Influence of the Public Health Nurse in Preventing Blindness and Saving Sight," were themes of conference sessions. The papers and the discussion alike were marked by their high standards of presentation and vital contribution to the subject of sight conservation.

The pitch of the annual meeting was sounded by the stirring message of Helen Keller, honorary vice-president of the Society: "Let us hold on to our cause and our faith that there will be still more eyes with light in them. Let us face the prophetic night, the press of the tempest, threats of the foe, and push further in every field of effort and prevention. The reward of the struggle is immense, and man's cry for light will nerve us to greater endeavor." The forward path, pointed out by Mrs. Winifred Hathaway, associate director of the Society, leads to goals where no sight-saving classes or classes for the blind will be needed; to the abolition of industrial accidents; to the ultimate reduction of eye accidents at play. "Scientific Advance and Welfare Problems in Sight Saving" was the theme of the address given by Alphonse M. Schwitalla, S. J., dean of the St. Louis University School of Medicine.

For the benefit of those unable to attend, as well as for those who wish the record for further study and reference, complete

Proceedings of the conference and meeting will be published as a supplement to the REVIEW, in a coming issue.

British Ophthalmologist Retires.—Mr. Bishop Harman, consultant ophthalmological surgeon of the health section of the London County Council, has recently retired from active service. A tribute is paid his thirty years of service on the behalf of eye health of London's school children in the *British Medical Journal:* ". . . His reports on the causes of blindness and seriously defective vision were for a long time the most authoritative statistical data available. He is best known, however, for his work in connection with classes for the partially sighted; and the initiation and development of the system of special education for partially sighted children in London is due in large measure to his enterprise and foresight." Classes for visually handicapped children in this country, too, owe much to the inspiration and stimulus of Mr. Harman's work in developing special educational facilities for myopic children in Great Britain.

American Board of Ophthalmology Examinations.—The 1936 examinations for the American Board of Ophthalmology will be held in Kansas City on May 11, concurrent with the annual meeting of the American Medical Association, and again in New York, in October, at the time of meeting of the American Academy of Ophthalmology. All applications and case reports must be filed at least 60 days before the date of examination. Information and application forms may be obtained from Dr. Thomas D. Allen, assistant secretary, 122 South Michigan Avenue, Chicago.

Prenatal Syphilis.—The return to the current New York stage of Ibsen's *Ghosts*, a play dealing with the shadow of congenital syphilis falling upon the life of a young man, reminds those who have read or seen the play that such a sequence of events need no longer be, if the aid of medical science is called upon in time. When Ibsen wrote *Ghosts* over forty years ago the disease was recognized, but science had made little headway in finding ways to treat it; it was not until twenty-five years after the writing of *Ghosts* that the germ, spirochaeta pallida, was discovered; only in recent years

has it been known that treatment of the infected expectant mother prevents the disease from passing to the unborn child, and lays the "ghost" that haunted Ibsen's hero.

More and more communities are recognizing the public health responsibility of preventing congenital syphilis, and its sequelae of infant mortality, blindness, mental disease, etc., and are making it a project for direct and drastic attack. New York City has recently established a bureau in its health department whose sole concern will be the treatment, the cure, and the prevention of venereal disease, through establishment of adequate clinic facilities and through the promotion of public information as to treatment and prevention. The state of New Jersey has made public a study of deaths from communicable diseases in that state for 1934; typhoid, scarlet fever, measles, diphtheria, and infantile paralysis together caused 221 deaths; syphilis killed 324. The chart showing these figures carries the message: "Save Generations to Come from Syphilis. The above chart shows deaths in New Jersey during 1934 from various communicable diseases. No baby need be born with syphilis though the parents be infected. Every expectant mother should submit to a blood test early in pregnancy. Syphilis is preventable and can be cured. If you have a venereal disease, or think you have, consult your physician at once or inquire of your local board of health of the New Jersey State Department of Health for location of the nearest clinic."

The annual Regional Conference on Social Hygiene, under the auspices of the New York Tuberculosis and Health Association, will take place on January 15 at the Hotel Pennsylvania in New York City. The growing recognition of the importance of education and action in combatting venereal diseases is demonstrated in the large numbers of representatives from health and social welfare organizations from New York, New Jersey and Connecticut who annually attend these conferences.

Pipe Smokers Most Likely to Have Tobacco Amblyopia.—During the past 22 years the Royal Infirmary of Edinburgh, Scotland, has treated 1,856 cases of tobacco amblyopia—a disease that causes gradual dimness of vision with an increasing sensation of mist before the eyes. According to Dr. H. M. Traquair, ophthalmic

surgeon speaking for the Infirmary, nearly all of the sufferers were pipe smokers, snuff users, or tobacco chewers. In only a small number of cases were cigarette smokers affected. Fortunately, tobacco blindness is curable within a few weeks by stopping all use of tobacco.

Survey of Physically Handicapped in California.—Under the direction of the Bureau of Vocational Rehabilitation of the Department of Education in California, a study has been made that is of special importance to physically handicapped persons and to employers. The REVIEW interests itself in the findings made on the partially sighted person. In this survey, which included a thorough canvass of families and industries in 19 representative California cities, there were found among physically handicapped (who make up approximately three per cent of the total population), 11 per cent with partial vision or blindness. In the study of disabled persons employed in industry, which covered some 3,250 establishments with a total of 169,489 employees, there were found among those employed at least 2.3 per cent who were handicapped in some degree. At least 8 per cent of these 3,925 handicapped persons were either partially sighted, one-eyed, or blind. In general, it was found that physically handicapped persons have standard wages, nearly equal opportunity for advancement, and are successful at their work. An analysis of occupational possibilities further disclosed that for the partially sighted, 71 per cent of 14,460 jobs are theoretically open to them. "It is believed," says the *Survey*, in conclusion, "that as a result of the survey, a large number of employers have a far better idea of the efficiency and employment feasibility for the physically handicapped and many have already indicated willingness to employ disabled persons otherwise qualified for particular jobs."

A detailed study of the occupations now followed by visually handicapped persons, as outlined in the report of the study, *Census and Industrial Survey of the Physically Handicapped in California*, should be of special interest to teachers, parents and vocational advisers of sight-saving class pupils, although some of the findings are surprising. For instance, 18 partially sighted persons are employed as truck drivers. Selling and soliciting are positions

entirely compatible with a visual handicap, and, according to the theoretical possibilities, office work offers a broad field for the partially sighted.

Poor Illumination Found in Connecticut Clothing Factories.—Lighting conditions and equipment in 32 clothing factories, employing slightly more than 2,600 women and girls, were studied to determine the effect of light on the health and efficiency of women workers. Although meter readings were taken at a time of day that workers had maximum benefit of natural illumination, 91 per cent of the readings fell considerably below the 25 foot candle level recommended by the American Standards Association for sewing on dark cloth. On cloudy days, all readings fell below it. Nearly half of the readings, taken on sunny days, failed to reach even 10 foot candles. Not only was the lighting of the factories insufficient, but the fixtures—ranging from a bare drop light to lamps in tin reflectors—were poorly spaced, and productive of glare. In some cases workers had improvised shades; in one factory, girls said that they often sewed in the dark rather than endure the glare of the light.

Myopia Greatly on Increase Among Japanese Students.—The fact that myopia has been found to be increasing rapidly among Japanese school children and students—being found in approximately 35 per cent of students—has alarmed the medical and educational authorities in Japan. Seeking the cause of a nearly 100 per cent increase in the incidence of myopia in the past twenty years, authorities advance several reasons: one factor which may contribute to it is the smallness of type used in dictionaries and textbooks; because of limited educational facilities and increasing population, children over the age of ten are forced into keen competition for places in higher schools; it is believed that the present generation is constitutionally weaker than its predecessors; and observation proves that the old buildings that house schools are inadequately lighted. Others are of the opinion that the eyes of Japanese children are weakened in infancy when babies are carried about on the backs of maidservants, with their eyes exposed to the direct rays of the sun. The prevention and control of myopia

presents a challenge to Japanese ophthalmologists and health and educational authorities.

Hawaiian Appropriation for Sight Conservation.—"The Light in His Life," a cartoon depicting a blind man saluting the light that streams from a $20,000 appropriation of the Hawaiian legislature for the conservation of sight and the rehabilitation of the blind, drawn for the *Hawaii Hochi* by cartoonist W. E. Moran, calls attention of the Islanders to the new hope for the blind and the partially sighted. This sum, to be expended in the coming biennium, definitely recognizes the pioneer work which has been done in the past three years.

International Commission on Illumination Establishes Standards.—The committee on industrial and school lighting of the International Commission on Illumination, meeting in Karlsruhe, Germany, approved the following resolution: The Committee on Lighting of Factories and Schools adopts the following minimum illumination standards for school lighting and recommends the use of higher values in the interest of studying to improve well-being and assure the protection of eyesight:

A.—Sewing and designing rooms and rooms where fine work is done—on the work . . . . . 10 foot candles

B.—Classrooms—on the desks and blackboards; study rooms and libraries—on the desks and tables; various rooms, sculpture studios, singing classes, laboratories—on the work; gymnasiums and recreation rooms for basket-ball, handball, boxing, wrestling, play rooms, swimming pools . . . . . 8 foot candles

C.—Auditoriums, assembly rooms, cafeterias, and other rooms where pupils congregate for extended periods but do not have to work . . . . . 3 foot candles

D.—Recreation areas, dormitories, stairs, corridors, and lavatories . . . . . 2 foot candles

It was further recommended that while in the present state of knowledge it is necessary to base on practical experience the illumination values for different tasks, every effort should be made to develop the study of the relations existing between illumination, the functioning characteristics of the eye, and the facility of vision, in order to put the lighting codes on a scientific basis. Since light-

ing conditions influence considerably the precision as well as the speed of working it is desirable that in addition to the study of the relation between illumination and production, attention should be called to the measurement of the accuracy of the work, particularly if it is possible to increase further the accuracy for illumination values higher than those required for the maximum working speed.

Health and Employment.—What is the effect of unemployment upon health? Of health upon employment? In a study of profession, clerical, skilled and semiskilled workers, some of whom were employed, others of whom had become unemployed early in the depression, and others whose unemployment dated from the late depression period, a definite relationship between health—physical efficiency—and employment status was found. In concluding his account of the study published in the November 15 issue of *Public Health Reports*, Dr. Harold S. Diehl says: "The specific physical defects and diseases which bear the most definite relationship to the employment status in all or most occupational groups are defective vision, impairment of hearing, dental caries, gingivitis and pyorrhea, abnormalities of the locomotor system, and suspicious chest findings. . . . A study of the table of physical findings cannot fail to impress one with the great possibility of increasing individual health, efficiency and happiness by the prevention or correction of physical handicaps in the employed as well as the unemployed groups . . . Although it is difficult to generalize from the findings in such diverse occupational groups as the subjects of this study, the data seem to justify the following statements: (1) That individuals who are in good health and who keep themselves as free as possible from physical handicaps are less likely to suffer unemployment than individuals who are handicapped by physical defects; and (2) that employers could expect greater efficiency from their employees if provisions were made to discover and correct their physical handicaps and to keep them in better health."

Sight Conservation Advances in Ithaca Schools.—A series of faculty meetings among Ithaca teachers will consider the question of sight conservation, not only in the sight-saving class, but among

all of the pupils in the school system. Held in the sight-saving classroom, these meetings will present not only theory but show in practice the best seeing conditions and materials that minimize eyestrain. Lessons on lighting will be given teachers, who, in turn, may give to their classes a project in lighting and the use of the sight meter.

Movies and the Eyes.—Movies are harmless to healthy eyes, according to an inquiry conducted by the Italian Institute of Educational Films through questionnaires sent to 15,784 school children and to leading ophthalmologists. Nevertheless, to avoid eyestrain, certain rules are suggested: that attendance be limited to one hour at a time; that there be two or three minutes' rest every ten to fifteen minutes; that attendance be prohibited to children having uncorrected errors of refraction or muscle balance and to those whose corrected vision is 20/40. These suggestions for cinema eye hygiene might well be considered in the United States, where the Saturday afternoon offering at the local movie lasts four hours or longer. Eye hygiene, as well as programs, for children should be included in the study of motion pictures for children.

Help for the Cross-Eyed Child.—The cross-eyed child needs prompt, corrective treatment, say the Canadian National Institute for the Blind and the Canadian Council on Child and Family Welfare, in a joint publication prepared by members of the staff of the Ophthalmological Department of the Toronto General Hospital. The pamphlet emphasizes the points: What is a squint? What causes a squint? How should a squint be treated? and the parental responsibility for instituting prompt corrective measures.

Hazardous Playthings.—Both *Hygeia* and *Safety Education* for December add their pleas for safety at play by asking for the elimination from Christmas lists of playthings hazardous to the eyes. Says *Hygeia:* "The BB rifle has no place near the Christmas tree. Each year, following the holiday season, a number of children are blinded because a playmate with a BB rifle missed his aim. Any gun that is designed as a toy should be taboo. The popgun,

with its cork and string, looks harmless enough, but boys are not satisfied to shoot an object that is held in check by a string. They like to insert stones, beads or dirt. The bow and arrow should not be given to a small child. The dart is a dangerous object. It looks more like a weapon than a toy and can inflict as much damage as a hurled ice pick. Sling shots and blow pipes are also dangerous."

Good Light in Printshop.—While daylight is the most perfect illumination for the compositor's table, a plant running on three shifts cannot arrange to maintain daylight illumination for twenty-four hours. The use of indirect illumination, supplemented by a false ceiling above the indirect luminaires, gives the compositor a uniform illumination level of 25 foot candles, evenly diffused and without glare, says the *Kalends Pictorial* of the Waverly Press. This intensity, under artificial illumination, is sufficient to cast a slight shadow behind the letters for quick identification. On the subject of intensities, says the *Kalends:* "Much propaganda has recently been issued with the aim of making people intensity-conscious. Research seems to indicate that as much harm can be done by intensities that are too high as by those that are too low. True, daylight may measure several hundred foot candles, and daylight is ideal, but equally true, no form of artificial lighting yet conceived can come even close to daylight intensity without creating a condition of glare very bad for the human eye."

Special Spectacle for Bedridden.—The problem of amusing and occupying the patient who is confined to a supine position for long periods is particularly difficult since reading and handwork are nearly impossible, and entail a terrific strain upon the eyes. A special spectacle to enable these patients to read or pursue eye tasks with normal ease has been devised in England, according to a descriptive note in the *British Journal of Medicine* for August 10; the spectacle, weighing no more than the spectacle having cataract lenses, utilizes prismatic shields and mirrors, so that the patient, holding a book upon his chest, looks directly upward to the reflected image.

Premarital Blood Test Required in Connecticut.—Connecticut has joined the ranks of states requiring a Kahn or Wassermann

test for both parties applying for a marriage license. From January, 1936, all applicants for marriage licenses must be certified by an approved laboratory as to their freedom from syphilis. While this step does not completely protect the non-syphilitic marriage partners from contracting syphilis, it does make possible a great advance in public education by calling attention to the seriousness of the disease and to the possibilities of its cure.

National Society Notes.—The Board of Directors of the National Society is happy to announce the election as third vice-president of Mr. Preston S. Millar. Mr. Millar has served on the Board of Directors of the Society since 1915; he is president of the Electrical Testing Laboratories, and has been especially interested in scientific advancement in sight saving.

Mr. Lewis H. Carris, managing director of the Society, was a speaker at the annual Congress of the National Safety Council; he has accepted membership on the Executive Committee of the Child Education Section of the National Safety Council. At the invitation of the Tennessee Valley Authority, Mr. Carris attended health institutes in Knoxville and Clinton, Tennessee, where he spoke on the conservation of vision.

The Society announces the addition of Mrs. Francia Baird Crocker, R.N., to its staff as associate in nursing activities. Mrs. Crocker was supervisor of the department for prevention of blindness of the Missouri Commission for the Blind for five years.

Mrs. Winifred Hathaway, associate director of the Society, has talked to varied groups in different sections on conservation of sight for school children: to school nurses at Hackensack, New Jersey; to students at New York University; to teachers of the Hughes School in Syracuse, New York; to the Physically Handicapped Children Section of the Western Central Zone of New York State Teachers, at Rochester, New York, where she also talked at the state Demonstration and Practice School on "A Community Program for Saving Sight"; to the round table and annual meeting of the Illinois Society for the Prevention of Blindness, in Chicago; to the department of Special Classes, State Association, in St.Louis; to the Institute for Public Health Nurses under the auspices of the

Missouri Commission for the Blind, in St. Joseph; and at the Perkins Institution and Massachusetts School for the Blind.

Representing the Society at the Rochester Tuberculosis and Health Association's institute on conservation of vision, Mr. Louis Resnick, director of industrial relations, talked on "Eye Accidents at Work and at Play."

Mrs. Eleanor Brown Merrill, associate director, attended the meeting of the advisory committee for the summer round-up of the National Congress of Parents and Teachers, in Washington.

Field work will take representatives of the Society to Louisiana, Texas, New Mexico, Arizona, California, Missouri and Pennsylvania in the coming months.

Current Articles of Interest

Lighting the Rural School, Winifred Hathaway, *Public Health Nursing*, September, 1935, published monthly by the National Organization for Public Health Nursing, New York, N. Y. The problems of illumination in the rural school are sometimes complicated by lack of resources, yet the teacher and the school nurse have means at hand to improve lighting, through conscientious study and application of basic principles of illumination. Some practical suggestions are offered.

Turning the Light on Home Lighting, Hugh Grant Rowell, M.D., *National Parent-Teacher Magazine*, October, 1935, published monthly by the National Congress of Parents and Teachers, New York, N. Y. Because the scientific and hygienic principles of lighting, particularly in the home, are of fairly recent origin, most homes are poorly lighted for eye work. The author advises not only adequate light, diffused and without glare, but recommends that parents attend to the reading posture of their children to prevent eyestrain.

Ophthalmoscopic Appearance of the Nerve Head in the Newborn and in the Young Infant, Samuel Karelitz, M.D., and Peter Vogel, M.D., *American Journal of Diseases of Children*, October, 1935, published monthly by the American Medical Association, Chicago, Ill. The diagnosis of optic atrophy made on infants presenting grayish optic nerve heads after the first few days of life is likely to be erroneous, say the authors, who found that the optic nerve heads of all infants retain a grayish color over a much longer period than was supposed; in a series of 150 newborn and older infants, the pallor of the nerve head and grayness of the optic disk continued to be apparent through the third to the sixth month. In Negro children and in brunettes, the resemblance to the adult disk developed shortly after birth; in blonds and albinos, the pallor persisted over a period as long as six months. In a few closely observed cases, there seemed to be an improvement in vision with

the disappearance of the gray of the optic nerve, but there is insufficient evidence to prove a definite relationship.

Provisions for the Schooling of the Blind and the Partially Blind, Edward M. Van Cleve, *Archives of Ophthalmology,* September, 1935, published monthly by the American Medical Association, Chicago, Ill. When, in spite of ophthalmological skill and science, sight is lost or greatly impaired, the ophthalmologist must be ready to guide the patient into channels where the handicap is overcome by adequate education. The author, principal emeritus of the New York Institution for the Education of the Blind, describes the educational facilities open to blind children and stresses the importance of the ophthalmologist's knowing the routine of admission to schools for the blind and classes for the partially sighted.

Hereditary Cataract, Emanuel M. Josephson, M.D., *Eugenical News,* September–October, 1935, published bi-monthly by the Eugenics Research Association, Cold Spring Harbor, New York. Bilateral cataracts are found in almost half of the descendants of a woman having cataracts, through two generations; in a more affluent branch of the family, the cataracts did not affect the third and fourth generation. Cataracts developed at different ages, some before birth, and in the poorer members, continued to develop in adult life. From the evidence, the family has a predisposition to develop cataracts, and in individual members, the development has been precipitated by some environmental stimulus. Since the development is greater among poorer members of the family, a discussion of the rôle of food deficiencies, toxic conditions, and endocrine disease as stimuli for the development of cataract is of interest.

Illumination Intensities for Reading, Miles A. Tinker, *American Journal of Ophthalmology,* November, 1935, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. A survey of the evidence leads the author to the conclusion that there is nothing to justify the suggestion that 25 to several hundred foot candles of light are essential for efficient reading of legible print by those with normal vision. Indeed, low intensities are to be pre-

ferred where diffusion of light is poor. He recommends the following specifications for light intensities to fulfill the requirements of hygienic vision for the reading of legible print by the normal eye: 3–5 foot candles with direct lighting and poor diffusion; 5–10 foot candles with the combination of direct and semi-indirect illumination frequently found in homes and offices; 10–15 foot candles with the better degrees of diffusion found in a few homes and offices. "If glare is eliminated, higher intensities may be employed without harm," says the writer, "but also without practical advantage . . . Eyestrain will not be avoided, however, unless light is adequately diffused at these higher intensities."

Turning the Light on School Lighting, Hugh Grant Rowell, M.D., *National Parent-Teacher Magazine,* December, 1935, published monthly by the National Congress of Parents and Teachers, New York, N. Y. Suggestions for lighting the school room, for utilizing all the available daylight and supplementing it when necessary with artificial light, are offered by the physician to Horace Mann School. He makes special suggestions for painting, window shades, seating, and maintenance of equipment at its maximum efficiency.

Book Reviews

CHARACTERISTICS OF DICHROMATIC VISION, WITH AN APPENDIX ON ANOMALOUS TRICHROMATIC VISION. F. H. G. Pitt. Medical Research Council, Reports of the Committee on Physiology of Vision, XIV. London: His Majesty's Stationery Office, 1935. 58 p.

This report of the Committee on Visual Physiology of the Medical Research Council (British) is the fourteenth of a series of special reports and deals for the most part with studies of an investigation of dichromatic vision. It is strictly technical in character and abounds in formulae and graphs. It is a necessary supplement to the library of anyone seriously interested in color vision as, without doubt, it represents an authoritative contribution.

ULTRA-VIOLET THERAPY IN EYE DISEASE. Frank W. Law, M.D., F.R.C.S. Foreword by Sir Stewart Duke-Elder. London: John Murray, 1934. 78 p.

The ophthalmologist interested in keeping up with the progress of modern therapy will rejoice in the appearance of this little volume. It is an effort to present secure data which are the bases for modern ultra-violet light therapy in diseases of the eye. Sections are included dealing with radium, X-ray and infra-red rays. The book is well planned, the language is clear, and the evidence presented is convincing. Throughout the work the reader is impressed with the fact that the author is not unjustly enthusiastic about his subject. He does not hesitate to stress the conditions in which the use of ultra-violet therapy has been unsatisfactory.

ATLAS OF EXTERNAL DISEASES OF THE EYE. Humphrey Neame, F.R.C.S. Philadelphia: P. Blakiston's Son and Co., Inc., 1934. 110 p. ill.

This valuable little work is composed of a series of beautiful and accurate colored illustrations, together with a brief statement of the major characteristics of the condition described. The book is a distinct addition to any ophthalmological library and is of particular value as a teaching aid.

JOHN N. EVANS, M.D.

Briefer Comment

PRINCIPLES AND PRACTICES IN SCHOOL HEALTH EDUCATION. 1935. New York: American Child Health Association, 1935. 363 p.

A compilation of material, presented at the eighth conference on health education, arranged by the American Child Health Association at the University of Iowa, considers the health education problems of rural and urban school systems. Approached from many angles, attacked by authorities from many sections of the country, the presentation of health education in this symposium is a challenge and a stimulation to health educators everywhere.

CO-ORDINATION OF EFFORT FOR THE EDUCATION OF EXCEPTIONAL CHILDREN. Bulletin 1935, No. 7. Compiled by Elise H. Martens. Washington: United States Government Printing Office, 1935. 82 p.

In this report of a conference called by the United States Office of Education representatives of agencies particularly concerned with the education and care of exceptional children have contributed to answer the questions: What are the major problems in which the Office of Education can be of assistance to representatives of the various groups of exceptional children? In what ways can representatives of the various groups of exceptional children be of assistance to the Office of Education? In what ways can the representatives of the various groups of exceptional children be of assistance to one another? How can the Office of Education and representatives in the field work together toward a better coordinated program for all groups of exceptional children? An appendix carries full description of the scope of national volunteer agencies concerned with the welfare and education of exceptional children.

THE EFFECT OF LIGHTING ON EFFICIENCY IN ROUGH WORK (TILE PRESSING). Joint Report of the Industrial Health Research Board and the Illumination Research Committee. Medical Research Council and Department of Scientific and Industrial Research. London: His Majesty's Stationery Office, 1935. 12 p.

THE RELATION BETWEEN ILLUMINATION AND INDUSTRIAL EFFICIENCY. I. THE EFFECT OF SIZE OF WORK. Joint Report of the

Industrial Health Research Board and the Illumination Research Committee. Medical Research Council and Department of Scientific and Industrial Research. London: His Majesty's Stationery Office, 1935. 14 p.

The investigation of the Industrial Health Research Board and Illumination Research Committee into lighting and efficiency in tile pressing has produced definite and striking results. The operation was chosen because it was rough work, of a simple, repetitive character requiring no fine perception of detail—the kind of work which, it is usually held, can be done in any sort of light. Two investigations were made under factory conditions . . . in both cases the shops had little daylight and poor artificial lighting at the beginning of the experiment. The artificial lighting was rearranged and subsequently increased in intensity, and records of hourly output were kept for before and during the alterations. The average output increased considerably with increased illumination at the lower levels and continued to increase, though slightly, at higher levels.

On the bases of these results it is suggested that an average illumination of at least three foot candles is a condition of efficiency in work of this type. (The existing levels at the working area in the two shops at the beginning of the experiment averaged between 0.5 and 1 foot candle.) . . . Detailed observations of the effect on the workers were not part of the experiment, but the investigators formed the opinion that psychological factors played an important part in the increased efficiency. It was found that although the workers had not previously complained of bad lighting, they welcomed the improvements and the pleasanter appearance of the shop which resulted.

The investigation to establish a scientific relationship between the size of work (i. e. the detail on which attention is concentrated) and the optimum illumination from the point of view of performance is also reported. It is the first of a series, and subsequent investigations are to be made into the effects of other variable factors, such as the rate of movement of the object, and the contrast between the object and its background . . . The results showed that the effect of size on performance is greater, at all illuminations, than is the effect of illumination at any size. . . . An obvious

practical application of these results is that, when a choice is possible, small work should be avoided. But in the majority of cases the problem is to determine the technical requirements of lighting at a given job, and here also the contribution is a valuable one. (Excerpt of a review article in *Industrial Welfare and Personnel Management*, September, 1935.)

EDUCATION OF THE SLOW-LEARNING CHILD. Christine P. Ingram. Introduction by Elise H. Martens. Yonkers-on-Hudson: World Book Company, 1935. 419 p.

Planned as a text for courses in the training of teachers for slow-learning pupils, the material on the mentally retarded child and the dull-normal and borderline pupil offers practical suggestions for the experienced teacher of special children as well as for those who must plan a flexible program for physically handicapped children having varying degrees of intelligence.

A STUDY OF SOME OF THE RESEARCH WORK CARRIED OUT DURING THE PAST FIVE YEARS ON THE DISTRIBUTION, ETIOLOGY, TREATMENT AND PROPHYLAXIS OF TRACHOMA, Melville D. MacKenzie, M.D. Epidemiological Report of the Health Section of the Secretariat of the League of Nations, April–June, 1935. Geneva: League of Nations, pp. 41–78.

A review of the considerable progress of the past five years in the knowledge of the distribution, etiology, treatment and prophylaxis of trachoma. The material is abstracted from the studies of trachoma specialists in all parts of the world, including such men as MacCallan, Pilat, Morax, Gifford, Thygeson, Noguchi, Bengston, Olitsky, etc. An extensive bibliography covering the important publications in English, French, Spanish and German should prove of great interest to the student of trachoma.

THE HOSPITAL ALMONER: HOSPITAL SOCIAL SERVICE IN GREAT BRITAIN. Prepared by a Committee of the Hospital Almoners' Association. London: George Allen and Unwin, 1935. 168 p.

Contributions from various fields of social service give a picture of the existing field of action in medical social service in England and suggest the future possibilities of the work. Of interest is the chapter on "An Almoner's Work in an Ophthalmic Hospital," which covers both prevention of blindness activities and care of the blind.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

184. **Popular Beliefs and Superstitions About the Eyes,** Charles A. Bahn, M.D. 20 p. 15 cts.

The atom of truth in most superstitions probably accounts for the persistence of the human race in believing in them. The author traces the foundations of many familiar superstitions about the eye.

185. **A Course in Eye Hygiene and Sight Conservation in Sight-Saving Classes,** Helen J. Coffin. 12 p. 10 cts.

Education for the future, as well as for the immediate use of eyes, is a basic duty of the sight-saving class. This course is the result of careful estimate of pupil needs and graded capacity to learn.

186. **The Relative Visibility of Print in Terms of Illumination Intensity,** Matthew Luckiesh and Frank K. Moss. 12 p. 10 cts.

How much light? What kind of light? are questions that interest ophthalmologists, school officials, business and factory directors—and parents. One of a series of articles on illumination.

187. **The Causes of Blindness in Children,** Conrad Berens, M.D., C. Edith Kerby, and Evelyn McKay. 8 p. 10 cts.

The direct relationship between causes and prevention of blindness is brought out in a factual presentation of findings made in 20 schools for the blind.

188. **The Eye Examination in Industry,** Thomas D. Allen, M.D. 12 p. 5 cts.

The need for complete eye examination as well as physical tests to be made at the beginning and at frequent intervals for the worker is demonstrated in this article.

189. **Hereditary Blindness,** Gabriel Farrell. 12 p. 5 cts.

What everyone should know about the transmission of certain diseases of the eye and causes of blindness to prevent the defect passing to coming generations.

D84. The Mechanics of Reading, James E. Lebensohn, M.D. Reprinted from *Hygeia*, November, 1935. 4 p. 5 cts.

Popular discussion of the ocular and mental interplay in reading, and suggestions for treatment of reading difficulties.

D85. The Causes of Blindness in Children, Conrad Berens, M.D., C. Edith Kerby, and Evelyn McKay. Reprinted from the *Journal of the American Medical Association*, December 14, 1935. 8 p. 10 cts.

Full report of the paper presented at the annual meeting of the American Medical Association, with discussion and charts.

Contributors to This Issue

Dr. Charles A. Bahn, who is a practicing ophthalmologist in New Orleans and president of the Louisiana Society for the Prevention of Blindness, is also a member of the Advisory Committee of the National Society.

The death of **Helen J. Coffin,** supervisor of sight-saving classes in the Cleveland Public School System, has robbed sight-saving classes of a guide and mentor, and members of her professional field of an experienced counselor.

Matthew Luckiesh, D.Sc., and Frank K. Moss, who collaborate frequently in books and articles on the subject of light and sight, are both members of the General Electric Company; Dr. Luckiesh is director of the lighting research laboratories in Nela Park, Cleveland, Ohio.

Dr. Conrad Berens is ophthalmologist of the Light House Clinic for Prevention of Blindness, and surgeon and pathologist of the New York Eye and Ear Infirmary; **Miss C. Edith Kerby** is statistician of the National Society for the Prevention of Blindness; **Miss Evelyn McKay** is social research secretary of the American Foundation for the Blind. All three are members of the Committee on Statistics of the Blind.

Book reviewer: **Dr. John N. Evans,** a faithful contributor of reviews to the REVIEW, has recently been appointed professor of clinical ophthalmology at the Long Island College of Medicine.

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